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BRITISH MEDICAL JOURNAL

LONDON SATURDAY APRIL 5 1941

REHABILITATION OF THE INJURED

BY

E. A. NICOLL, M.D., B.Ch., F.R.C.S.Ed.

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Since the outbreak of war considerable interest has been aroused in the subject of "rehabilitation," and it is therefore important that the meaning and application of this word should be clearly defined. Unfortunately, different people use it in different senses. Sometimes it is used to denote the training of cripples for special occupations adapted to their disabilities; but this is not rehabilitation, it is vocational training, and should always be referred to as such. Rehabilitation is an entirely different process, the object of which is to cure or reduce disability resulting from trauma so that the injured person is enabled to return to his ordinary work in the industry in which he was formerly employed or, failing that, to useful alternative work in the same industry. Vocational training is essentially a process of compromise with disabilities that must be accepted as permanent, and is necessary only in the relatively few cases in which rehabilitation fails. The more thoroughly the problem of rehabilitation is tackled the less need there will be for vocational training.

Standardization of Results

It is obvious that the difficulty of the problem depends on the nature of the work for which the patient has to be reconditioned. If a carpenter sustains a compression fracture of the spine or a fractured femur he will be fit for full work at a stage in which a miner is only fit for what is euphemistically described as "light work" in a pit. It is difficult to suggest a universal standard by which results may be assessed and compared, but in my own work amongst injured miners return to full work has been adopted as the criterion of full recovery. Return to permanent "light work" is classified as permanent partial disability, and inability to do any useful work in a pit is regarded as permanent total disablement. To appreciate these standards something must be known regarding the nature of a miner's work. To get to it he usually has to walk several miles underground on difficult surfaces. The head-room of his working space averages about three and a half feet, but may be as low as two feet. The average amount of coal which each man hews and loads at the coal face under these cramped conditions is twelve tons per shift, but it may be as high as eighteen in an easily worked seam. Finally, there is no really light work in coal-mining, and the jobs that are usually given under this heading are the equivalent of full work in most other industries.

These standards are unusually severe tests of recovery, but they have the advantage of searching out imperfections which less exacting methods fail to disclose. Half the cases in my fracture clinic—that is, about 1,200 a year—are those of miners injured at work, and it is in respect of these that statistics are kept regarding restoration of working capacity.

The Miners' Rehabilitation Centre

My experience in rehabilitation as a special problem is derived from the Miners' Rehabilitation Centre at Berry Hill Hall. This centre was established by the Midland Colliery Owners' Mutual Indemnity Company in association with the Bolsover and Butterley Colliery Companies, and is at the service of the entire coalfield, which extends over seven counties. It is administered by a committee consisting of two representatives of the Owners' and two representatives of the Miners' Union. The rehabilitation problem in coal-mining is a very big one because the accident rate is so high (five times higher than the average industrial accident rate), the injuries are of a severe type, and there is no really light work to offer disabled men. Among the 100,000 men employed by the owners concerned in this scheme there are 18,000 accidents a year in respect of which compensation is paid; 6,000 of these men are totally incapacitated for more than a month, and 800 for more than six months. It is chiefly from the latter class that the cases for the rehabilitation centre are drawn. In my own fracture clinic about 15% of the cases are transferred. These are of three kinds:

(*a*) Severe injuries—e.g., fractured femur, compression fracture of the spine—which on past records have a high risk of permanent partial disablement as judged by the criterion of return to full work as miners. These cases are transferred as soon as the men are capable of undertaking daily exercises.

(*b*) Cases which have come to a standstill short of full recovery, however simple the original injury might have seemed. Formerly these men were sent back to light work in the hope that it would prove remedial and that they would progress to full work in the course of time. A recent survey has shown that in fact 60% of such men remain permanently on light work. The reason for this is not far to seek. Light work, if it is to have any remedial value, must be selected, supervised, and graduated by the surgeon just the same as any other form of occupational therapy. In actual practice light work usually terminates the surgeon's connexion with the case.

(*c*) Cases in which some permanent disablement is inevitable from the outset but in which much can be done to reduce this and so restore to permanent light work patients who might otherwise have been totally disabled.

The Miners' Rehabilitation Centre is a modernized country mansion with 100 acres of grounds, to which a first-class gymnasium and a remedial workshop have been added. It is not part of a hospital, and this in my opinion has definite psychological advantages. Patients who live near enough are allowed to attend daily, but

those from further afield and all who are under-nourished or whose home circumstances are in any way unsuitable are kept in residence. The treatment is intensive and individual, and consists of graduated remedial exercises, occupational therapy, physiotherapy, and remedial games. Perhaps most important of all is the daily and hourly preaching of the gospel of rehabilitation—that recovery can only come by the unremitting hard work of the patient himself.

Importance of Soft Tissues

Before describing these methods of rehabilitation in detail I would like to draw attention to certain general principles which have an important bearing on the earlier stages of treatment. Recovery of function depends ultimately on the muscles, which may be affected either directly at the time of injury or by atrophy due to disuse. Direst trauma may mean actual laceration as in a compound fracture, simple contusion as in the case of a long bone ensheathed in muscles (e.g., fractured femur), or over-stretching as in hyperflexion fractures of the spine. The difference between immobilizing a normal muscle and immobilizing a damaged muscle is that whereas both undergo atrophy, the latter is much more liable to undergo contracture as well, owing to the organization of traumatic exudates into fibrous tissue. The degree of contracture will depend on the severity of the initial damage and the duration of immobilization, and its effect will be to cause limitation of movement in the joint over which it acts. If, for example, an uninjured quadriceps is immobilized for ten weeks in the treatment of a fractured tibia and fibula full movements of the knee-joint are usually recovered within a week of removing the plaster; but if a contused quadriceps is immobilized for ten weeks in the treatment of a fractured femur, flexion of the knee-joint takes months to recover, and the majority of cases never recover full flexion.

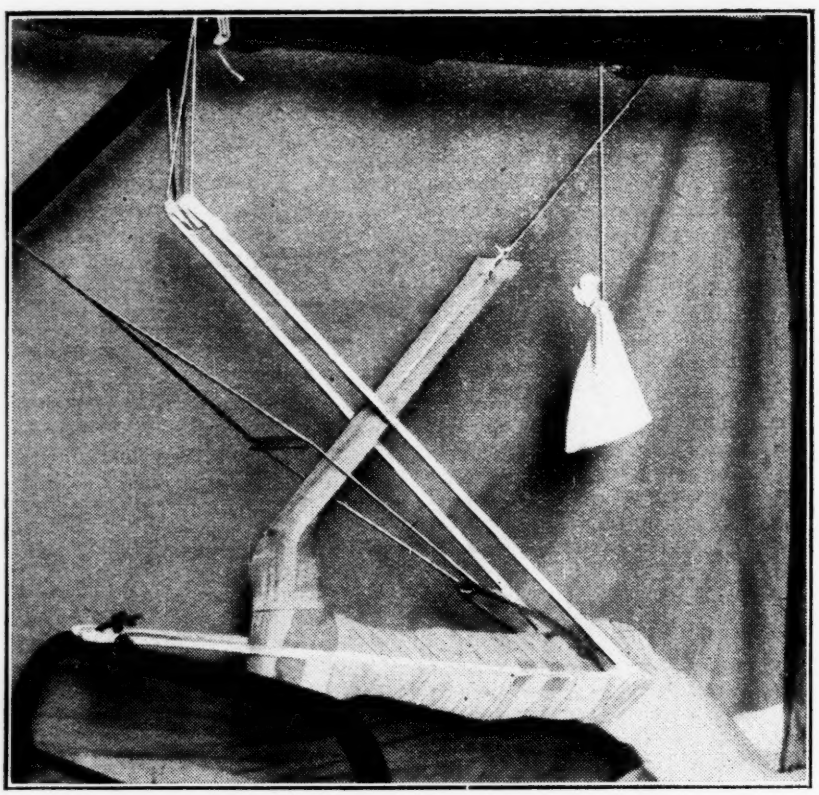

FIG. 1.—"Rehabilitation starts on the first day of treatment."

The chief problems encountered in the later stages of rehabilitation result from the immobilization and disuse of damaged or normal muscles—loss of power due to atrophy, stiffness due to contracture, and pain due to localized fibrosis. These are the disabilities that remain with the patient for ever—the true "end-result disabilities" that so often spoil a good radiographic result. If every case were regarded from the first not simply as a fracture but as a soft-tissue injury complicated by a fracture there would be less danger of looking upon rehabilitation as a sort of salvaging process to be undertaken in the remote future. On the contrary, the attitude of the surgeon should be such that conservation of function in the soft tissues becomes a major issue from the very beginning. A wasted fibrotic muscle is not an act of Providence and it cannot be cured by the laying on of hands or any other mysterious process in the physiotherapy department. It is as great a reproach to the surgeon and a greater handicap to the patient than a malunited fracture, because whereas the latter is a mechanically correctible disability, the retrogressive changes that take place in neglected muscles are incurable once they have passed a certain point. It is the responsibility of the surgeon to see that they do not pass this point during the period of immobilization.

Conservation of Muscle Function

Conservation of muscle function during the period of healing of the fracture applies both to the parts that are immobilized and to those that are free to act but are out of functional use. A few examples will serve to illustrate the principles involved.

1. In a "below-the-knee" plaster (e.g., in a fracture-dislocation of the ankle) the object of a walking-iron is to make the patient use his quadriceps against the resistance of body weight, which is infinitely more effective for conserving their function than non-weight-bearing exercises of the knee-joint. The calf muscles, however, are the real problem in these cases. They cannot exercise at all in a normal sense; but, even so, they need not be regarded as out of the picture until the plaster is removed. The synergic action of muscles should be taken advantage of. If the toes are actively and strongly dorsiflexed the plantar flexors of the ankle-joint immediately contract synergically. They do this in order to fix the ankle-joint, which would otherwise be dorsiflexed by the extensors of the toes; but the reflex is so fundamental that they still contract even when the joint is already fixed in plaster. If toe exercises are done strongly enough and regularly enough in such a case the synergic contractions of the leg muscles induced thereby will be sufficient to prevent a good deal of wasting and fibrosis during immobilization. Similarly, in an arm plaster, if the fingers are strongly flexed the extensors of the wrist go into synergic contraction, while strong extension of the fingers brings the flexors of the wrist into similar action. Yet how often are finger exercises, and especially toe exercises, neglected altogether, or the plaster so badly cut that they are impossible? A very important point in these exercises is that they must be done strongly—gentle ladylike movements produce little synergic effect.

2. In a fractured femur the position is reversed. The ankle is free to move, though out of functional use, while

the quadriceps is only free to perform "static" contractions. These, however, must be done with the greatest regularity throughout the period of immobilization from the third week onwards. In regard to the "defunctioned" ankle-joint, this should not only be exercised through a full range of movement but it should be exercised against resistances comparable to weight-bearing stresses, thereby treating the leg muscles as one does the quadriceps in a "walking-plaster." Many text-books on fractures still reproduce photographs showing methods of supporting the ankle-joint in fixed dorsiflexion on a Thomas splint. This is entirely wrong. It should be free to move all the time, but its position of rest should be that of dorsiflexion. The simplest and most effective method of doing this is shown in Fig. 1: the weight in the bag is gradually increased so that during the whole period of splint treatment the patient is practising graduated resistance exercises for the calf muscles. No patient treated for fractured femur should ever have the slightest difficulty afterwards in regard to either the ankle-joint or the calf muscles.

3. In hyperflexion fractures of the spine conservation of function in the extensor muscles of the back is of paramount importance. Ankylosis in bad position gives a perfect functional result provided the muscles recover, but failure of these to recover always results in partial disablement for heavy work, however good the reduction and consolidation of the fracture.

These and similar measures for the conservation of muscle function require a great deal of co-operation on the part of the patient, and the surgeon or some responsible member of the fracture clinic team must be prepared to ensure that it is forthcoming. Ignorance, stupidity, apathy, and sheer laziness must all be overcome. In a fracture ward there are always a few good "workers" who can be disposed at strategic points where their influence and example will spread to less determined patients. Another asset is a ward sister who is more concerned with seeing that exercises are carried out than with keeping the bedclothes tidy. In out-patient cases instructional exercise classes must be held for those in plaster, and these patients must be thoroughly impressed with the necessity for carrying out their exercises assiduously at home. In fact, the more experience one gains in dealing with the later stage of rehabilitation the more one is impressed with the importance of these earlier measures. With good muscle recovery and an imperfect radiographic result there is always hope of complete functional recovery; but even if this does not materialize, operative correction still offers a chance of completely retrieving the situation provided muscle power is conserved. On the other hand, perfect radiographic results combined with atrophied fibrotic muscles end in disability that is permanent and irretrievable. It is no satisfaction to a working-man who cannot earn his living to know that his radiographs are being used to demonstrate the principles of accurate reduction.

Power and Mobility

At the Miners' Rehabilitation Centre the more one analyses disability the more one becomes convinced that the key to success is restoration of muscle power. Mobility is an advantage only in proportion to the power of the muscles to control it under the conditions of stress normally encountered at work. One has to think of plantar-flexion of the ankle, for example, in terms of pushing tubs of coal rather than in terms of walking across a floor. Muscles have two functions in regard to joints—they supply motive power in one direction and act as shock-absorbers and stabilizers in the other. This shock-absorbing mechanism is of great importance to miners and other working-men whose joints are subjected to great strain. If it is deficient the joint "gives way" under stress and a mild sprain is produced. Repeated traumata of this kind lead to chronic synovitis or even arthritis, which in their turn exert an inhibitory effect on the muscles so that a vicious circle is set up. That is why a patient who returns to heavy work with weak quadriceps complains that his knee swells at the end of the day and his leg does not get any stronger in spite of active use. It is also why traumatic arthritis is progressive, and the only rational treatment of the latter, therefore, is to strengthen the muscles that exercise a protective action on the damaged joint.

To a miner diminished mobility with full muscle power gives a much better functional result than full mobility with diminished muscle power. I have seen several instances of men with only 45 degrees of movement at the elbow-joint doing full work at the coal face while other men with 120 degrees of movement were unable to do so. Mobility, therefore, is not always an end in itself, and if muscles already weak have to be stretched in order to produce it, as in manipulative treatment they often are, the patient may be better off without the extra mobility.

Muscle-efficiency Tests

It is obvious that if muscle power is the key to success some method of measuring it must be adopted so that the value of different kinds of treatment may be assessed. This is done at Berry Hill Hall by expressing the power of a particular group of muscles as a fraction of the sound side. In the case of the extensor muscles of the back, which cannot be expressed in this way, a known standard is determined by testing normal subjects. The apparatus necessary to determine muscle efficiency is a system of pulleys and weights designed so that any desired movement can be isolated and performed against measured resistances. In the quadriceps extensor group, for example, the method employed is to load the sound leg till its "exercise tolerance" is reached. By this is meant the greatest weight that can be raised fifteen to twenty times in succession as an exercise. The same procedure is then repeated on the injured leg, and the result expressed as a fraction (e.g., $\frac{R}{L} = \frac{12}{25}$).

These muscle-efficiency tests have been carried out in a great many conditions, and the results are very instructive. For example, in compression fractures of the spine treated by reduction and ambulatory plaster for four to six months the efficiency of the extensors of the back is often as low as 20% after removing the plaster. This is so in patients who have done exercises throughout the period of immobilization. The results of these muscle-efficiency tests are charted week by week in the form of a graph, and constitute a very reliable guide to progress and to the value of different methods of treatment (Fig. 2).

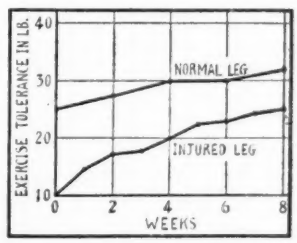

FIG. 2.—Muscle-efficiency chart. Quadriceps extensor group in a case of fracture of shaft of femur.

It becomes obvious at once why it is better to recover joint mobility by active movements alone. To do so ensures that muscle power increases with the mobility, so that the joint never recovers more movement than can be controlled under stress. In the great majority of cases stiffness after fractures is due to fibrosis in the muscles, and if such cases are manipulated any increased movement obtained is at the expense of tearing and stretching the fibrosed muscles. The charts of such cases reveal an immediate drop in muscle efficiency—often as much as 50%.

Manipulation should be avoided as far as possible, therefore, in those cases in which stiffness is due to

muscle fibrosis. Sometimes it has to be resorted to because the degree of stiffness is outside the limits of functional usefulness at work, and then the golden rule is to do a little at a time and repeat it every few weeks. If this is done the depression of muscle efficiency is minimal and the pre-manipulative level can be regained in a week or two. During the intervals the stretched muscles are treated daily. This treatment consists of active exercises to the limit of tolerance, deep massage to painful areas, and surging faradism. There is a second type of stiffness due to fibrosis and contracture in ligamentous or capsular structures, and this responds well to a full manipulation. The muscle efficiency in these cases is not depressed by the manipulation, and subsequent recovery is dramatic.

The Analysis of Functional Disability

The first essential in rehabilitation is an accurate analysis of the disability. The patient does not tell the surgeon which muscles are at fault; he expresses the disability in terms of function, and says what he cannot do or what he finds difficult or painful. In leg, back, and pelvic cases there is nearly always some disturbance of gait to analyse as well. Good analysis depends on a knowledge of the anatomy of function, which is not the way we learn anatomy. We are taught the action of isolated muscles instead of the muscle work of purposive movements such as walking, lifting, pushing, and so on. Yet without this knowledge it is impossible to analyse faulty gaits, obscure aches and pains, and difficulty in performing certain everyday acts. Still more impossible is it to analyse difficulty in performing complicated movements encountered in the course of heavy work. A patient may say, for example, that he can walk all right on the flat but finds difficulty in walking downstairs. This is common in quadriceps cases and is simply a question of mechanics. When the whole body weight is on one leg, the more the knee-joint flexes the more power is required on the part of the quadriceps to stabilize it, just as the load on an engine pulling a train round a curve is very much greater than when it pulls the same train along a straight track.

Lifting weights off the ground, which is vitally important to miners, is chiefly a gluteal action extending the hip-joints, but the spine must be fixed in relation to the pelvic girdle by a powerful static contraction of the sacro-spinalis muscles. It is failure of the latter that prevents miners from doing heavy work at the coal-face after a compression fracture of the spine; but the same functional disability might be due to a myofascial sprain of the gluteus maximus. All the miner knows is that he cannot lift the sort of weights he is called on to lift at work, and that efforts to do so are painful. Intelligent rehabilitation therefore depends on good analysis of functional disability, which in its turn depends on a knowledge of the anatomy of function and of the effects of trauma on soft tissues.

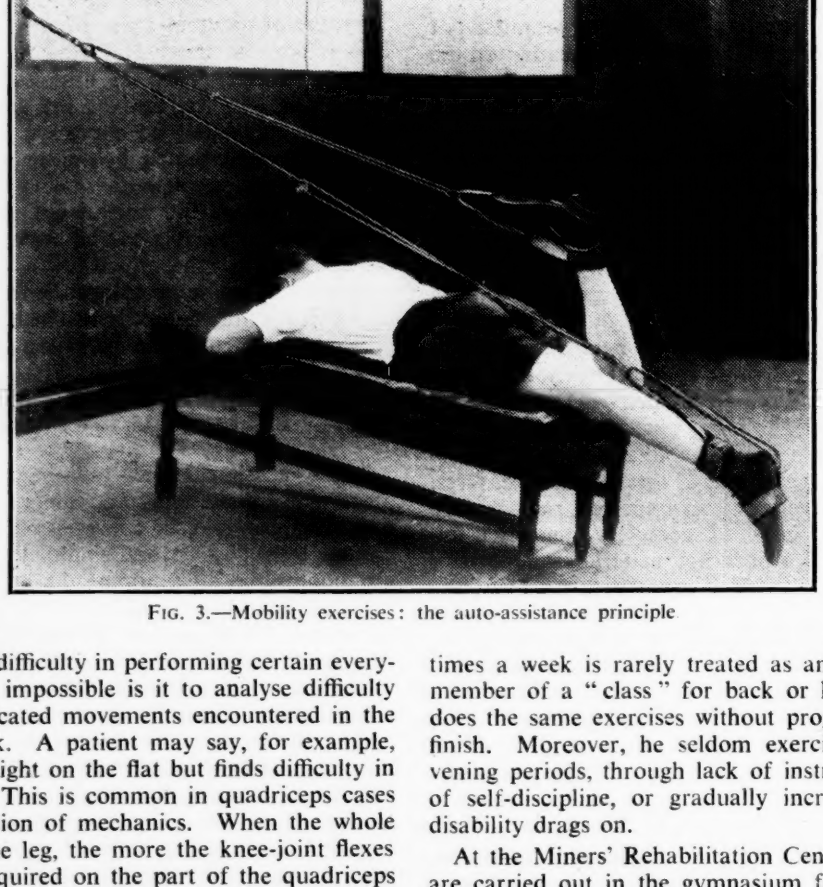

FIG. 3.—Mobility exercises: the auto-assistance principle

Remedial Exercises

Having analysed functional disability on these lines, what is the remedy? What, in other words, is the secret of redeveloping weak muscles? The answer is that it can only be done by the unremitting efforts of the patient himself. Muscles hypertrophy only in proportion to the demands made upon them day after day and week after week. That is why professional footballers have such magnificent quadriceps, though their arm muscles may be quite ordinary. Exercises must therefore fulfil two conditions: they must be specific for the muscles concerned, and they must be progressive. The principle of progression is of the utmost importance in rehabilitation, whether in relation to remedial exercises, occupational therapy, or games. Remedial exercises constitute the backbone of treatment, but they can only succeed if certain conditions are fulfilled. They must be performed day in and day out *ad nauseam*; they must be performed against gradually increasing resistances, and the periods of exercise must be correctly spaced with periods of rest so as not to induce undue fatigue. They fail in most cases because none of these conditions is fulfilled. The out-patient who attends an exercise class three times a week is rarely treated as an individual. He is a member of a "class" for back or leg or arm cases, and does the same exercises without progression from start to finish. Moreover, he seldom exercises during the intervening periods, through lack of instruction to do so, lack of self-discipline, or gradually increasing apathy as his disability drags on.

At the Miners' Rehabilitation Centre remedial exercises are carried out in the gymnasium for two periods of an hour and a half each day. They are arranged into a series of progressive schemes for each type of case, and are under expert supervision. In a back case, for example, there are four schemes, and it takes the average patient eight weeks to work through them. It is outside the scope of this paper to describe remedial exercises in detail, but one or two points are worth special mention. The first is in regard to a type of assisted active movement in which the patient himself provides the assistance with the opposite limb. It is illustrated below for flexion of the knee (Fig. 3). This type of mobility exercise is specially useful (*a*) when unassisted active movement is painful (this is frequently the case in shoulder injuries, or after a manipulation); and (*b*) when unassisted active movement is not powerful enough to make any headway

against the resistance imposed by the fibrosed structures causing the stiffness.

I know that passive movements are nowadays condemned, but many of these patients would never make any headway without some assistance. I differentiate between passive movements and assisted active movements, however, and, provided the assistance is given by the patient, it can do nothing but good. Relaxation of the opposing muscles is the crux of the matter, and to obtain this the patient must have perfect confidence. If a second person is providing the assistance the patient instinctively puts the brake on long before the limit of tolerance is reached, because any other method of informing the operator that he is approaching this point would be too slow to act in time. With the patient himself in control, however, perfect relaxation is possible right up to the full limit.

The second point is in regard to graduated resistance exercises, which are extensively used for selective strengthening. The principle is best illustrated by the hypertrophy of involuntary muscle. If the intestines or the bladder have to work against a gradually increasing obstruction they invariably hypertrophy—often to a remarkable degree. The two factors which produce this hypertrophy are a gradually increasing resistance and a muscle acting almost continuously in an effort to overcome it. If the load is increased too suddenly, however, failure occurs. These factors apply equally to voluntary muscle, and the more difficult the case the more gradual must be the progression. The muscle-efficiency chart is the real index of progress.

To give graduated resistance exercises the same pulley-and-weight apparatus described earlier for measuring muscle efficiency is used. It can be applied to any muscle group in the body, but to illustrate the method the quadriceps extensor group will be used as an example. First of all the exercise tolerance of the affected muscle is determined—that is, the greatest weight the patient can raise with his quadriceps fifteen to twenty times in succession. At regular intervals, depending on the individual factors, half a pound is added, often without the patient's knowledge. He can work with these maximum loads for only very short spells, so the method followed is to intersperse these with more prolonged exercises against 50% of the maximum load. By this method satisfying results have been achieved in the most unpromising cases. As an example, it has been found possible to increase the quadriceps efficiency from 4 lb. to 26 lb. (normal leg, 32 lb.) in an old-standing case of a man who had been off work for two years following a knee injury.

Accessory Methods

The other forms of treatment used, which make up the rest of the six-hour day, are occupational therapy, physiotherapy, and remedial games. These are accessory methods, however, and it is fallacious to think of rehabilitation entirely in terms of one or the other, as a good many people nowadays do. Indeed, this seems to be the official conception of rehabilitation. At Berry Hill Hall we rely on remedial exercises to gain ground, and on occupational therapy and remedial games to consolidate it. The idea of adding creative interest on the one hand or competitive interest on the other is very sound and attractive, provided such ideas are not allowed to become a hobby-horse and obscure the essentials underlying them. The weakness of both is that neither the principle of selectivity nor the principle of progression can be so scientifically applied. Furthermore, none of the forms of occupational therapy in standard use would get a miner anywhere near the stage of full work.

Occupational Therapy.—It is impossible in the limits of this paper to deal in detail with the application of occupational therapy or remedial games to particular injuries, but a brief description of both as organized in a rehabilitation centre may indicate their general usefulness. Occupational therapy is divided into indoor and outdoor work. The men at Berry Hill Hall assist in the laundry and do all the domestic cleaning in the gymnasium. In the craft-room the hand and arm cases are taught to make wicker-work baskets, trays, and stools, and leg cases to do treadle work. The remedial workshop is equipped for simple carpentry, and a miniature conveyer-belt has been installed which gives the back cases an opportunity of practising the movements and experiencing the stresses peculiar to their own work, but under controlled and progressive conditions. The belt runs over spindles operated by cranks, and motive power is provided by the advanced arm and shoulder cases. The action is like that of turning a mangle, but it is a progression on laundry-work. Logs of wood weighing from 10 lb. to 80 lb. are used instead of coal. Outside in the grounds of the estate there are gardening, timber-work (tree-felling, log-sawing, etc.), and the care of lawns, cricket pitch, tennis court, bowling green, etc. Each patient is scheduled to a class of work suitable for his injury, and as he makes progress in his gymnasium work he is correspondingly advanced in occupational therapy.

In addition to these forms of occupational therapy, some of which (e.g., timber-work) are quite heavy, I am able to use the enormous resources of the industry in placing men at a variety of jobs in the pits which can be used as a very advanced form of occupational therapy. Most back cases, for example, are sent to a period of "datalling" work, which involves a good deal of walking, bending, shovelling, and lifting, but allows the workman to pause occasionally between efforts instead of going "all out" all the time, as he would have to do at the coal-face. A knowledge of industrial processes is needed to place men properly if light work is to be successfully used as a remedial agent, and it is necessary to keep contact with such cases. Periodic re-examinations are therefore made till they either resume full work or have otherwise reached the limits of progress and been placed in the class of permanent light work most suitable for them.

Recreational Activity.—This also takes indoor and outdoor forms. Many games can be played in the gymnasium, but there is much more scope in the open air. Games such as badminton, bowls, croquet, etc., are played for amusement after the day's treatment has finished. During the official games period, however, the men are supervised in their activities and the games are more adapted and remedial. Back cases do particularly well on games like basket ball and tunnel ball. Leg cases, however, have to be carefully watched if they are allowed to play running games, otherwise a considerable number of sprains will be incurred, especially if there is a football about. This is because the muscles of these patients are not efficient enough to protect their joints against the sudden twists and strains of vigorous games. Leg cases are sent out in groups on bicycles, which is one of the most excellent of all forms of recreational activity, and many patients living within five miles or so of the centre cycle in every morning as part of their treatment. As in occupational therapy, recreational activity must also be progressive and adapted to the injury, and there is infinite scope for originality and ingenuity in the invention of new games to promote particular movements.

Physiotherapy.—Physiotherapy is confined to faradism and deep massage. The former is used as an auxiliary method of strengthening weak muscles; the latter in dealing with painful areas in muscles. These are quite

common following trauma, and they inhibit full active use of the muscle so that the patient is never able to get the maximum benefit from remedial exercises. They are due to localized fibrosis in areas to which traumatic exudates have gravitated. Deep massage is very effective, but it must be done properly—skin-stroking is useless. Preliminary injection with 2% procaine just below the muscle aponeurosis is helpful in many cases. Once the pain is abolished there is a dramatic increase in muscle power, showing that this was there all the time but was inhibited by the pain. In the analysis of disability referred to earlier it is important to distinguish this type of case from the one in which loss of power is due to atrophy alone, since the treatment is quite different.

Summary and Conclusion

In this paper the principles underlying the process of rehabilitation have been described. The final stages of this process are best carried out in special centres, but the earlier measures directed towards conservation of muscle function during immobilization are of equal importance.

The methods of treatment employed in a rehabilitation centre for injured miners are described. This centre was established by the employers of 100,000 workmen, the accident rate amongst whom is five times greater than the average accident rate in industry.

The only criterion by which success in rehabilitation can be judged is the patient's return to full pre-accident work and activity. Clinical attempts to assess this are unreliable. In a consecutive series of 1,200 patients treated in one year in the Mansfield Hospital Fracture Clinic, all of whom were miners injured at work, 87% resumed their full pre-accident occupation, and 9% resumed lighter work in the same industry. There was a mortality rate of 1%. In about 15% of the mining accidents dealt with in this clinic treatment is completed at the Miners' Rehabilitation Centre.

The Central Council for Health Education is able to command the services of some most talented people with the pen, pencil, and camera, and some of its leaflets, which are sold at production cost to local authorities and distributed in various ways by medical officers of health, are as telling as the very best commercial advertising. Three pictorial leaflets bearing the titles "Ears to Hear," "Eyes Right," and "Sleep" convey their message in a series of film-like pictures which make words largely unnecessary. A number of posters have also been brought out by the Central Council, and are so emphatic in their design and colour that he who runs may read. For those who may prefer to do their reading while not running there are a number of pamphlets on such subjects as the prevention of diphtheria, the war on lice, the elementary facts concerning milk, food, water, and sanitation, which lack nothing in the directness of the advice they give. A whole series of leaflets has been prompted by war conditions. Among them is a 16-page booklet on "Health in the Shelter," in which the clever levity of the drawings relieves the necessary seriousness of the text. It is the aim of the council to secure that every possible subject connected with health on which the public ought to be informed shall be illustrated by a popular leaflet or pamphlet. The war has opened up quite a number of new subjects, of which "Health in the Black-out," the title of a new leaflet, is one. The attractive booklet, "The Doctors tell you what to eat in Wartime," which was prepared by the British Medical Association at the request of the council, is another example of activity in this direction. It is suggested that some of these leaflets might be placed on the table in the waiting-rooms of medical practitioners. Medical practitioners, however much it may be against their mundane interests, are amongst the best apostles of preventive medicine, and we do not doubt that many of them will accept the invitation of the Central Council (whose address is Tavistock House, Tavistock Square, W.C.1) to have a free supply of this health publicity material sent to them for this purpose.

PULMONARY CONCUSSION ("BLAST")

BY

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"Every new ordeal to which the lung of man is exposed produces if not an entirely new lesion at least a new angle from which to study an old one."—LANCET.

"Pulmonary concussion" is a term which has been used for haemorrhagic lesions of the lungs resulting from the detonation of high explosive. Cases are recorded here which show that virtually the same syndrome can be brought about by the ordinary forces of civil life as by the action of bombs.

Experimental and theoretical considerations have now established beyond reasonable doubt that blast injuries of lungs are produced by the high-pressure wave of the blast acting for a short period; in other words, it is due to a sudden diffuse compression of the lungs through the chest and abdominal walls, and is typically unaccompanied by obvious injuries of the thoracic wall. "Diffuse" does not mean that the two lungs are equally affected, just as injury to the thoracic wall does not exclude the action of blast. A sudden diffuse compression of the lungs can readily be brought about by mechanical causes. More important under war conditions is the fact that the compression of blast and of mechanical forces frequently occur together. The most important difference between war and civil cases is the greater degree of violence in the former.

Comparison of Peace and War Injuries to the Lungs

I have notes of 94 necropsies made during the last three years on persons dying through road accidents. In reviewing these it is notable how many ribs may be fractured with no lung injury at all: 6 cases, all those of men between 58 and 69, had multiple rib fractures but no lung damage. Four more had multiple rib fractures and minor lacerations of the lungs from the rib ends, but no appreciable contusion of the lungs; these cases were those of a boy aged 13 and three men between 39 and 44. A man aged 21 showed lacerations and pulping of the lungs after an aeroplane crash. Three patients with fractures of the skull inhaled some blood; these were males aged 10, 13, and 19. Only 3 of the 94 had lung lesions comparable to those of the bomb cases; these were in girls aged 4 and 8, and a boy of 7. The best example is a girl of 4. A motor-lorry had run over her and caused a fracture-dislocation of the sixth and seventh cervical vertebrae, but no fracture of or external mark on the trunk. Her lungs showed multiple haemorrhages, which all appeared on the pleural surface; they were most numerous in the parts of the lungs which enter the phrenico-costal sinus of the pleura and posteriorly, but there was some rib marking on the lateral surfaces. The liver showed a small laceration of the posterior surface and there were some peritoneal tears in the transverse colon. The girl of 8 had been knocked down by a motor-car; she showed a little bruising over the left lower ribs but was otherwise unmarked: the ribs were not fractured. There was a haemothorax of nearly two pints on the left and a smaller one on the right. There was a large tear near the hilus of the left lung, and contusions were scattered fairly generally throughout both lungs. The liver was torn but the spleen was not. The boy of 7 was run over by a motor-lorry. He sustained an extensive fracture of the skull with brain injury. The trunk was not marked. The left lung showed a widespread haemorrhagic lesion about the hilus posteriorly, "rib markings" extending about three-

quarters of an inch deep, and a wedge-shaped contusion of the part in the phrenico-costal sinus. The right lung revealed innumerable haemorrhages the size of a pin's head, due to inhalation of blood from the left; the spleen showed a little superficial bruising only. The brain injury indicates that death must have been very rapid.

Lung injuries were therefore present in only 8 of the 94 cases. Of the 8 cases 4 were simple lacerations from fractured rib-ends and one was too gross to be of interest. The 3 most important cases were in children with flexible chest walls, and both were accompanied by abdominal injuries. The series does not include any case of compression asphyxia, but, looking through the series of asphyxial cases (suicidal hanging, homicidal strangulation, overlain babies, and babies born face down on to the placenta in a bucket), it is notable how inconstant Tardieu's spots are. My experience is the same as that given in Taylor's *Medical Jurisprudence* (1928), and does not agree with Ross (1941) that they "are nearly always found." They are interesting if found, but are so frequent in diseased conditions that they cannot be made a prominent part of any syndrome.

The four most interesting contusions of the lung did not occur in road accidents; they were described under the title of "phrenico-costal sinus pneumonia" (Osborn, 1940). The review of the road and bomb cases serves to emphasize the point made there that there is an abdominal component to the force which produces the basal contusion of the lung. If this wedge-shaped lesion is present the question is not "Is the underlying spleen or liver damaged?" but "How severely is it damaged?" It may be a trivial bruise or a hopeless tear.

The first 8 cases described below were from bombed houses.

Case 1.—A girl aged 17. Fractured skull the only external injury, no bruises or fractures about the chest or abdomen. The lungs showed a large wedge-shaped haemorrhage at the left base and a much smaller one at the right base; a fairly large haemorrhage into the posterior part of the right mid-lobe; haemorrhages posterior to the hilus on each side; and some small pleural haemorrhages laterally which were possibly "rib markings." Most of the haemorrhages reached the pleural surface. The upper pole of the spleen showed multiple tears; the liver and other abdominal organs were undamaged. This girl had blood-stained mucus and froth in the large air passages.

Case 2.—A woman aged 42, mother of the previous patient. She was beside her daughter when the house was hit, and also had a fractured skull. The upper three left ribs were fractured and the lung showed contusions in this region only; small haemorrhagic spots elsewhere were probably due to inhalation of blood. The lung changes in this case were very mild compared with those of the daughter; this may be because the mother was obese. She had no abdominal injury, and lived for about twelve hours after being hurt.

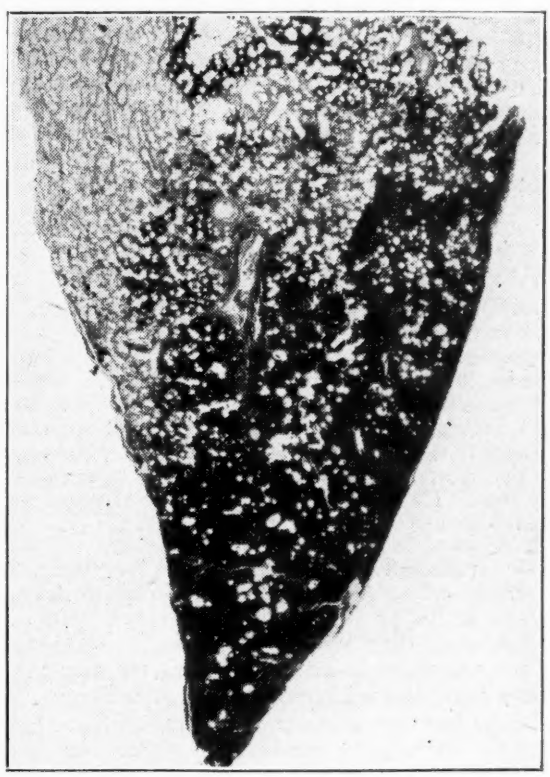
Case 3.—A girl aged 16 had multiple injuries which included pieces of wood driven into the trachea and left lung. There were scattered small haemorrhages throughout the lungs; a large one into the base of the right lung was accompanied by a ruptured liver beneath. The right hand and forearm had been blown off.

Case 4.—A young unidentified woman who was too mutilated for lesions to be instructive.

Case 5.—A man aged 40 who had a compound fracture of the skull but no injuries to the chest or abdomen.

Case 6.—A woman aged 40, wife of the previous patient, average size, not obese. There were large numbers of punctured wounds over the exposed parts of the body (head, neck, arms, and legs); with few exceptions these were superficial and did not contain foreign bodies. The largest were in the right suprascapular and supraclavicular regions; through the latter the axillary vessels had been pulped. This injury was of interest because it was evidently the place where a collection of dirt particles measuring 1 by 0.3 by 0.3 cm. had entered the vein to lodge in the right ventricle; the heart itself was not damaged. The skull showed four perforations about 1.5 cm. in diameter in the frontal and parietal regions; bone had been driven into the cerebrum through two of these. Both orbital plates of the frontals were fractured upwards, with orbital contents projecting through; there was no injury about the eyes to account for this. The base of the skull was not damaged otherwise, but there was haemorrhage into the middle and internal ear on the left side. The chest was free from external marks, but the upper four right ribs were fractured posteriorly at their angles; these had not caused any laceration of the lung. The right apex showed a healed tuberculous focus 1 cm. in diameter, the left apex a smaller lesion. Old adhesions were present over the right upper lobe and the left apex. The right pleural cavity contained half a pint of blood, the left none. Much blood and mucus (not frothy) were present in the trachea and large bronchi. There was a massive haemorrhagic lesion of nearly all the right upper and mid lobes; the right lower lobe was normal. Scattered throughout the left lung were very large numbers of small haemorrhagic spots due to inhalation of blood from the right side (see below). No pleural haemorrhages were observed on the left side. There was no phrenico-costal sinus lesion and no injury to the abdominal organs. This woman lived three hours.

Case 7.—A woman aged 26, of average size and nutrition. There was a perforating wound of the left chest posteriorly about the inferior angle of the scapula. A bomb splinter



Phrenico-costal contusion (Case 7). Photomicrograph (× 3) of wedge-shaped haemorrhage into base of right lung. The clear parts in the dark haemorrhagic zone are mostly distended alveolar ducts and small bronchioles. This lesion always suggests laceration of the underlying liver or spleen.

weighing 2.5 grammes had passed through the seventh rib here, through the left lung in the interlobar region, through the anterior part of the pulmonary artery and the right cusp of the pulmonary valve, and had come to rest in the right ventricle close to the tricuspid valve without doing any damage in the ventricle. There was free haemorrhage into the lung along the path of the bomb fragment and also posteriorly; the left base was practically clear. The right lung was normal except for a perfect example of the phrenico-costal sinus contusion (see Fig.). This was placed laterally and posteriorly, was wedge-shaped, and measured 7 cm. from

front to back, 4 cm. upwards, and about 3 cm. deep at the upper part, which was appreciably raised from the surrounding normal lung on the pleural surface. This haemorrhage was firm, but lacked the almost stony hardness of the lesion in the civil cases which survived some days. There were multiple tears of the liver, tears of the upper pole of the spleen, and a superficial tear of the upper pole of the left kidney.

Case 8.—The 7-months-old baby daughter of the previous patient. She had a depressed fracture of almost the whole of the left frontal bone with brain tissue protruding around it. There were no other marks of any sort on the body. The lungs showed very distinct haemorrhagic rib markings laterally on each side; these became confluent in several places, notably the posterior portion of the right lung. In parts the rib markings extended a full centimetre into the lung, and were separated there, as on the surface, by clear lung tissue. All haemorrhages in these lungs were represented on the pleural surfaces. The only haemorrhages not related to rib markings were on each side in the part of the lung that enters the phrenico-costal sinus. These were not relatively as large as the wedge-shaped lesion in Case 7, but were associated with several tears in the liver. The abdominal organs were otherwise normal.

The following two very recent cases, which have a bearing on the mechanism of production of the lesions, may merit a brief note.

Case 9.—A girl aged 11 collapsed under an anaesthetic of open ether just as an operation for the removal of an acutely inflamed appendix was being completed. As she did not respond to the usual methods an upper abdominal incision was made and the heart was massaged. The auricles started beating, but not the ventricles. At necropsy she appeared to have been a healthy girl. She was deeply cyanosed; the blood was dark and fluid. There was extensive bruising of the ventricular muscle from the massage. This bruising was not beneath the pericardium, where the direct force had been applied, but was a very short distance from the endocardium. The endocardium was not injured. The bruising appeared to have been produced by the reactionary force of the compressed blood.

Case 10.—A baby girl aged 15 months was brought to the Infirmary moribund; she had inhaled a piece of bean four hours previously. This blocked the left main bronchus and part of the right. When seen by the casualty surgeon she had stopped breathing, but the heart could be heard beating infrequently. Artificial respiration was applied, but failed to revive the child. At necropsy the left lung was seen to be collapsed, the right partly collapsed. Very small numbers of Tardieu's spots were present, but haemorrhagic rib markings beneath the visceral pleura were quite distinct, especially over the left lung. The rib markings were very shallow when compared with cases from the bombed houses. They were probably produced by the artificial respiration, and were more noticeable on the left side because the left lung was extensively consolidated while the right still contained some air.

Microscopical Features

Two main types of lesion are seen microscopically. In the primary and larger haemorrhagic lesions there is free haemorrhage from the alveolar capillaries, while the alveolar ducts and bronchioles are typically air-containing and almost free from haemorrhage. The larger bronchioles and small bronchi in the worse lesions—e.g., the right lung of Case 6—give good evidence of compression of the lung from without. They are collapsed, and practically all the goblet cells in the mucosa have been ruptured, causing a stream of mucus to flow into the bronchial lumen; with the mucus is a little blood but very little air. The mucous glands and the basal, intermediate, and ciliated cells of the bronchial mucosa are little affected compared with the goblet cells. Incidentally this shows well how much mucus is available from goblet cells alone to make the bronchial mucous plugs of the influenzal lung. The relative scarcity of goblet cells in that part of the lung which enters the phrenico-costal sinus may account for the difficulty in recognizing this lesion in the wedge-shaped haemorrhages there. Rupture of goblet cells appears to indicate severe lung damage. Distension of alveoli with blood or air (emphysema) regularly accompanies compression haemorrhage, and subpleural bulla formation is fairly common.

The second main type is the result of inhaled blood, and is apt to be mixed with the previous type. Blood is present in the small bronchi of the affected region, and distension of alveoli is not usually as marked. Typically this lesion is relatively small and scattered, and in my cases has been accompanied by much more serous exudation in the surrounding alveoli than is seen in the compression haemorrhage. Goblet cells are, of course, not ruptured.

Is the Haemorrhage Progressive?

Hadfield and Christie (1941) state that they regard the haemorrhage in these cases as being progressive and that "in reviewing a series of post-mortem examinations of 17 of these cases we have been struck by the variability in extent of these haemorrhages, and it appears reasonable to relate this variation to the period of survival after exposure to detonation." With these statements I am quite unable to agree. The haemorrhagic lesions themselves are not necessarily fatal, though it is easy to imagine rapid death from shock. The most probable reason that their patient lived fifty-one hours is that the abdominal component appears to have been confined to submucous gastric haemorrhages. There are too many unknowns in my cases as well as in those described by Hadfield and his colleagues (1940) to imagine that we can correlate the extent of the lesion with the period of survival. Of these published cases the period of survival was known in only 4 out of 19, and though the notes of 2 are scanty it would appear that 3 out of the 4 patients who survived some time were not as badly affected as some who died more rapidly. The probable reasons for more severe lung lesions are the severity of the causative force and the state of the patients. By the state of the patients is meant whether they are obese or not, whether they have flexible or rigid chest walls, whether their lungs are in the position of inspiration (making it worse) or expiration at the time of injury, and the amount of clothing worn by the victim. It is the state of the patient which explains why these cases did not attract attention during the last war. The potential victims then were grown men wearing a respirator, knapsack, and other things which would protect their body walls from the impact of the blast wave; now we are seeing unprotected girls and children attacked by bombs in confined spaces. Some direct evidence can be given indicating that the haemorrhage is not progressive. First, the haemorrhage is into alveoli which are arranged in limited groups. Only a little of this blood gains access to a bronchus to reduce the raised pressure due to the haemorrhage. Secondly, the haemorrhage is from capillaries. Capillary haemorrhage typically ceases within about five minutes and requires only a slightly raised pressure to stop it. Thirdly, the cases of "phrenico-costal sinus pneumonia" seem to prove that the bleeding is not progressive. The wedge shape, size, and raised pleural surface laterally and cranially are similar in the cases of bomb injury and in the patients who survived for two and seven days. In the last two cases the most advanced organization was at the upper end of the lesion near the unaffected lung tissue: here the alveoli showed much more fibrin, and phagocytic cells were more active. There was no evidence of more recent haemorrhage at the upper limit of the lesion, and the best-preserved red cells were in the centre of the lesion, where it appeared that resolution would take longest. For these reasons I believe that the primary lesion is not progressive, but the reaction to the lesion may make it appear to be so, especially in *x*-ray plates.

Mechanics of Haemorrhagic Concussion of the Lungs

Reasons for believing that the lesions are due to the high-pressure wave of the blast acting on the body wall and not to positive or negative pressures acting through the trachea and bronchi are given by Zuckerman (1940), and need not be repeated. Additional proof is given here by (1) the mechanics of "phrenico-costal sinus pneumonia" (Osborn, 1940), and (2) the goblet-cell lesion and collapse of the bronchi in the worse cases.

Zuckerman (1941) goes to some pains to belittle the effects of blast unless the victim is very close to the bomb, and states that there have been very few cases of blast injury of the lungs in England so far. Lung injuries having the features described by Sir Joseph Barcroft (1939) and by Zuckerman in animals are now only too common in hospital practice. An attempt has been made here to show that the same lesion may result from a sudden diffuse compression of the chest and abdomen by bombs and mechanical means. Whether the lesion is entirely due to blast or not seems to be of little more than academic interest. Zuckerman may be correct when he says that there is little danger from blast more than thirty feet away from the explosion of a big bomb in the open, but there is no justification for belittling the effects of blast in confined spaces such as houses. We have no means of telling what blast pressures the victims in houses were exposed to: the positive pressure there cannot fall until free access to the outside air is obtained. There is also no justification for his statement that "at sixty or seventy feet the pressures did not really matter at all clinically, even though they might be sufficient to damage walls and windows" and "throw a man against a hard surface." Zuckerman's statement is usually true just as it is usually true that if we fall over we will not die of "phrenico-costal sinus pneumonia"; in each case, however, it is how the violence is applied that matters, and the unusual in each case may be common in medical practice if sought after.

What is the force which actually brings about the capillary haemorrhage in haemorrhagic concussion? Two forces have to be considered. These are the compression of the lungs through the chest wall and diaphragm and the counter-pressure exerted by the air in the alveoli. When danger threatens it is instinctive for the muscles to go "on guard"; this includes spasm of the glottis more or less locking the air in the lungs. The high pressure produced in this alveolar air by compression is the most likely force which ruptures the capillaries. This explains why the haemorrhages are deep and often massive; it may also help in understanding their distribution. In my cases this type of haemorrhage has mostly occurred in young adults and has not been associated with rib markings. Haemorrhages from the primary force are likely to be found in cases in which reflexes are not well established—e.g., in small babies and experimental animals. Thus Case 8 is a perfect example of haemorrhages produced by the ingoing ribs, etc., in a baby of 7 months. Other cases—e.g., Case 1—show a combination of both types of force. The findings in the baby's case certainly do not support Ross's (1941) statement that rib markings are a feature of "compression asphyxia" in which "death has presumably been slow, with attempts at respiration"; at least I am sure that this baby died quickly. I cannot see how Ross correlates Sir Joseph Barcroft's and Zuckerman's findings in pure blast injuries of animals with her statement that "in haemorrhagic concussion the lesions are always bilateral and roughly symmetrical. There is general congestion of the lungs. Pleural haemorrhages are present only as an extension from deeper areas." Rib markings were the main findings in goats: "These lesions consisted of bruising of the surface of the lung in the line of the ribs and vertebral borders, and extended for one-quarter to half an inch into the tissue of the lung": this is also a description of the baby (Case 8). Zuckerman showed that one lung might protect the other if the animal was placed side-on to the explosion: this apparently is more likely to happen if the animal is fairly close to the explosion. To understand the lesions described for blast in animals and man there is no need to assume that blast has any mysterious properties; it is only a more severe diffuse sudden compression of the chest and abdomen than we see in civil cases during peacetime.

Main Clinical Features of Pulmonary Concussion

The great majority of cases so far reported have come from bombed houses and shelters: pulmonary concussion appears to be infrequent in cases injured in the open. In houses it takes longer to dissipate the high-pressure wave of the explosion, and mechanical factors are likely to be added to the blast effects. Pulmonary concussion should be looked for in every case from a bombed house.

Factors tending to minimize pulmonary concussion are advancing years, obesity, rigidity of the chest wall, the position of expiration, and thick clothing. Pulmonary concussion may take a number of forms, which depend on the state of the patient as much as on the degree of violence. The younger the victim the more probable is it that the haemorrhagic lesions will be subpleural ("rib markings"). Young adults usually have deeper haemorrhages. Much mucus in the air passages (with blood) indicates that goblet cells have been ruptured in the bronchial mucosa; this means that the lungs are severely affected.

So far too little attention has been paid to the fact that the abdomen is suddenly compressed as well as the thorax. The wedge-shaped lesion of the part of the lung which enters the phrenico-costal sinus of the pleura is of exceptional importance because it indicates with a high degree of probability that the underlying liver or spleen, or both, have been torn. If these tears are severe the victim will be found dead: doubtless some will be amenable to surgical intervention. In my small series the liver and spleen were affected much more often than the bowel; bowel tears were confined to the peritoneal surface and would have needed no treatment. Should operation ever be indicated the organ responsible for the abdominal haemorrhage is likely to be demonstrated by the side of the phrenico-costal sinus lesion. If this is placed posteriorly as well as laterally on the right side the tear in the liver will probably be inaccessible. Tears of the spleen are likely to be at the upper pole.

Pulmonary concussion is not necessarily fatal. Sir Joseph Barcroft found that his goats usually recovered if they were not killed rapidly; Zuckerman also found his smaller animals tended to get better. It is worth recalling that in one of my cases of "phrenico-costal sinus pneumonia" death resulted from acute pulmonary oedema after two days, and in another case death occurred from pulmonary embolism after seven days. The latter cause of death is preventable: it is due to stasis in the femoral veins allowing the formation of clot, which becomes detached after about a week and is then carried to the right heart and pulmonary artery. Pulmonary embolism is prevented by regular active movements of the lower limbs aided by raising the foot of the bed to prevent haemostasis and by avoiding dehydration and other causes of haemoconcentration. If the patient does not die soon death may result from complications such as these, and probably the most important thing in treating haemorrhagic concussion of the lungs is to anticipate and so prevent such complications.

A "very clear history of the incident" cannot be obtained by the clinician, and its importance in diagnosis and treatment has been much exaggerated. It is of great value to know that the case is from a bombed house or shelter, and this is nearly always known. With this knowledge the most accurate diagnosis of the state of the lungs will be made by a consideration of the state of the patient (see above) and not from a knowledge of the size of the bomb. The peculiar behaviour of blast on houses is now so familiar (e.g., I have seen a shop window within six feet of a bomb crater in the road with only a single crack) that it is just as likely as not that the clinician would be misled by a "very clear history of the incident." The clinician will not be misled if he applies sound clinical methods, which should include repeated radiographs, if possible, and special attention to the phrenico-costal sinus region.

The knowledge that the case has occurred in a confined space will also help the clinician if he keeps in mind the important observation of Hadfield and his colleagues that these patients are prone to suffer from carbon monoxide poisoning.

Summary

Cases of pulmonary concussion from civil life and bombed houses have been compared.

Pulmonary concussion is almost the rule in cases from bombed houses, but not from bomb injuries in the open.

The mechanism of the lesion is considered. In bombed houses mechanical factors may add to the effect of the blast pressure.

The state of the patient is probably of greater importance than the size of the bomb or the distance from it. Knowledge of the details of the bomb may be misleading. In houses the positive pressure cannot fall until walls and roof are blown open.

The actual lesion is mainly haemorrhage from alveolar capillaries. Only a little blood gets into the bronchioles, etc., in these parts. Rupture of goblet cells and liberation of much mucus indicates a severe lesion. Secondary inhalation of blood gives a different picture.

Certain parts of the lungs are predisposed to injury. Thus we find subpleural "rib markings," injury in the phrenico-costal sinus region, and deep and posterior lesions in the region of the hilus. A consideration of primary (compression) and reactionary (counter-pressure of air locked in alveoli) forces may explain differences.

The abdomen is typically compressed with the thorax. The most important lesions here are tears of the liver and spleen.

The lesion itself is not progressive, but the reaction is. Treatment is largely anticipation of complications. The usual methods of artificial respiration may cause pulmonary concussion.

I am indebted to Detective-Sergeant J. S. Fayers for the photomicrograph.

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The London Hospitals Street Collections Central Committee (36, Kingsway, W.C.2) has issued a leaflet with reference to Hospitals Day in 1941, which includes a message from the Patron, H.M. the Queen. As in 1940, all participating hospitals will have the opportunity of collecting both in May and in October; the dates chosen are Tuesday, May 6, and Tuesday, November 7. A list is given of the hospitals co-operating and the amount received by each from last year's combined street collections, which totalled over £46,000.

ELECTRO-ENCEPHALOGRAPHY IN TRAUMATIC INTRACRANIAL HAEMORRHAGE

BY

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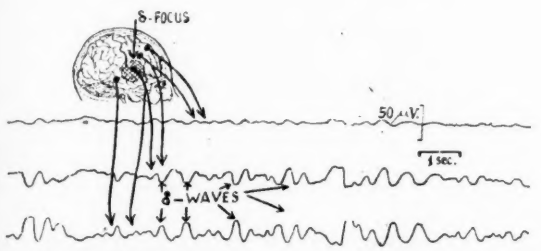
Electro-encephalography is becoming more and more important in the detection of various intracranial lesions, and Berger's contention that the phenomena which he described would afford a means of diagnosing certain pathological conditions of the brain may be said to have been generally upheld. So far, however, electro-encephalography has not been used to any extent in the investigation of cases of head injury; consequently it would appear desirable to record such evidence as may be obtained concerning its value in these cases, particularly when intracranial haemorrhage has occurred. Records from cases of traumatic intracranial haemorrhage are conspicuously few. In this country Prof. Rendle Short and Miss Dunster (1940) have published the findings in the case of a patient aged 42 with a middle meningeal haemorrhage upon whom operation was successfully performed. A tracing from a case of chronic subdural haematoma in an Italian aged 41 is included in a paper on electro-encephalography by Balado, Romero, and Noiseux (1939) of Buenos Aires; and some examples of intradural haemorrhage, both extra- and intra-cerebral, have been noted by Jasper, Kershman, and Elvidge (1940) of Montreal. The case here noted is a further instance of an encysted subdural haematoma following head injury which at the time of operation presented singularly few symptoms.

Case Report

On July 24, 1940, a marine aged 20 was knocked out in the boxing ring, and on regaining consciousness a few minutes afterwards had a severe headache. An hour later he vomited. He did guard duty that night, however, and was able to go out on a route march next day. His headache, which was now chiefly in the left frontal and occipital regions and at times was accompanied by pain in the back, continued, so he reported sick and was admitted to hospital. There was neck rigidity at this time, his temperature was 99° F., and his pulse was consistently slow (48 to 50). Both optic disks were blurred; the tendon reflexes were normal and the plantar responses flexor. Leucocytes numbered 10,000 per c.mm., *x*-ray examination of the skull was negative, and the cerebrospinal fluid pressure in the lumbar pond was 250 mm. of water; the fluid itself being deep yellow in colour, with a protein content of 120 mg. per 100 c.cm. The chief symptoms now were headache and photophobia, but these got better as he rested in bed. On August 29 Surgeon Captain Macdonald Critchley and I were called in to see him. He was inclined to be fatuous, the left knee-jerk was brisker than the right, and the left plantar response was extensor. High papilloedema with exudates and retinal haemorrhages was present in both optic disks. On September 24 Mr. W. Grey Walter, to whom I am much indebted for the tracing (see Fig.), carried out electro-encephalography at the Burden Institute under the direction of Dr. Golla, and reported: "There is a very low potential discharge at varying frequencies in the right fronto-temporal region, most definite in the neighbourhood of the Sylvian point. The small size and irregular frequency of this discharge would suggest that it is vestigial and not associated with any active destructive process." On September 7 the patient felt quite well, was free from headache, and declined operation. The highly choked disks, however, were still present, and, because of these and the slight left pyramidal signs and the electro-

encephalographic findings, it was considered that he had a chronic subdural haematoma overlying the right cerebral hemisphere.

Operation.—Operation was carried out on October 3, a right subtemporal craniotomy being performed under pentothal-nitrous-oxide-oxygen anaesthesia. When the dura was



Electro-encephalogram in a case of traumatic intracranial haemorrhage (subdural) in a man aged 20.

opened a blood cyst was exposed, occupying the Sylvian fissure and overlying a large area of the cortex. Part of the cyst wall was removed and its contents were evacuated by washing with Ringer's solution and by suction through small soft rubber catheters. The cerebrum was flattened and depressed beneath the cyst, but gradually expanded to take up the space this had previously occupied. Six weeks later the optic disks were normal and the patient was returned to duty.

Commentary

Various diagnoses had been suggested, among which were tuberculous meningitis, intracranial tumour, and subdural or subarachnoid haemorrhage. On clinical grounds these were eventually reduced to haemorrhage or a tumour which might have been either in the right frontal region or in the posterior fossa, the subtentorial site being suggested particularly by the intensely choked optic disks. Ventriculography would in all probability have at once determined the location, but this was conveniently done by electro-encephalography, the great advantage of which, as Rendle Short and Miss Dunster have pointed out, is its relative simplicity and harmlessness—unlike ventriculography and aero-encephalography, which are not simple or altogether devoid of the risk of unpleasant consequences. As these writers also point out, it remains for the future to show how accurate localization by electro-encephalography will prove to be; but meanwhile it is important to record experiences of it as these are encountered. It might be anticipated that a meningeal haemorrhage (vide Rendle Short's case, previously referred to) and a subdural haematoma (case here recorded) would behave electro-encephalographically somewhat similarly because in each case the cerebral cortex is separated from the skull by a comparatively good conducting medium—namely, the haematoma. This was found to be the case by Jasper and his co-workers (1940), who point out, however, that, in contradistinction to such extracerebral collections of blood, an intracerebral haemorrhage may sometimes be detected and localized by the delta activity arising from surrounding grey matter damaged by the haemorrhage in the substance of the brain. If this is confirmed, electro-encephalography will be still more valuable in the investigation of cases of intracranial haemorrhage by providing some guide to subsequent surgical procedures.

One further feature of the case here recorded may be noted. Normal disks and normal vision are now present after a high degree of choking (approximately 5D) of both optic disks from the end of July until early in October, when the patient consented to operation. How long the retinae are capable of withstanding a high degree of choking of the nerve heads before showing signs of optic atrophy and visual impairment is an important problem still not completely decided, but among other factors the age of the patient is probably important. In this particular case the retinae of a man aged 20 were able to sustain a high degree of papilloedema for some nine to ten weeks without subsequent atrophy of the optic disks or any evidence of visual impairment.

Summary

The electro-encephalographic findings in a case of traumatic intracranial subdural haemorrhage are noted. These, together with those of the few cases hitherto described, constitute cumulative evidence of the value of electro-encephalography as an aid to the detection and location of traumatic intracranial haemorrhage.

The retinae of a man aged 20 were able to withstand high choking of the optic disks for some ten weeks without subsequent interference with function, vision returning to normal after operation and the papilloedema subsiding without signs of atrophy.

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BLOOD CONCENTRATIONS FOLLOWING LOCAL APPLICATION OF SULPHONAMIDE COMPOUNDS TO WOUNDS

BY

FRANK HAWKING, D.M.

WITH A NOTE BY

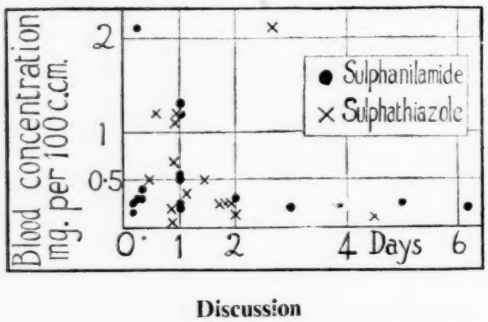
J. E. PIERCY, F.R.C.S.Ed.

The insertion of sulphonamide compounds into wounds to prevent or reduce bacterial infection is a procedure that is now widely practised, and it will doubtless become more important in the future because of its promising results and the increasing number of wounds to be treated. The present paper describes the concentration of the compound which occurs in the blood following this procedure.

The observations have been made mostly with sulphanilamide and sulphathiazole. Each compound was applied as a powder sprinkled into the wound. In fresh wounds this was done at the time of the first operation, following débridement; the wounds were then closed by primary suture whenever possible, and compound fractures were put up in plaster. These procedures were performed by the surgical staffs of the New End Hospital and of the Hampstead General Hospital. The compounds were also inserted into a number of sinuses with chronic sepsis and into large ulcers associated with varicose veins of the leg. The powder was prepared in 5-gramme lots in small glass bottles with screw caps, such as are used for bacteriological specimens; these bottles can then be sterilized by dry heat or by any other method desired for the operating theatre. The estimations of the compounds in the blood were made by the method of Marshall and Litchfield (1938). Concentrations are expressed as mg. per 100 c.cm. of sulphanilamide or of sulphathiazole respectively.

The concentration of sulphanilamide found in the blood of these patients is shown in the table and the graph; the latter refers only to cases which received a single application of the compound. The figures are irregular, as might be expected from the diversity in size and conditions of the wounds, but the blood concentration

after twenty-four hours rarely exceeded 1.5 mg. per 100 c.cm., and usually it was only 0.5 mg. or less. After the first forty-eight hours the blood concentration (with one exception) was negligible.



Discussion

These concentrations are much lower than those found by Jensen, Johnsrud, and Nelson (1939). Those workers inserted 5 to 15 grammes of sulphanilamide into 41 cases of compound fracture and observed a maximal blood concentration of 6 to 14 mg. per 100 c.cm. at eighteen hours; after sixty hours the concentration was negligible. The difference in results is probably due to the difference in quantity and identity of the compound applied and to the nature of the wounds treated. Herrell and Brown (1940) inserted 1.6 grammes of sulphanilamide as a suspension three times daily into infected pleural or peritoneal cavities and observed blood concentrations as high as 2.5 or 3 mg. per 100 c.cm.; but when the compound was applied to other sites—e.g., fractures or ulcerations—the blood concentrations were minute. It may be concluded from these results that treatment by insertion of a sulphonamide compound into a wound can safely be reinforced by oral administration, and that if the bacteriostatic effect is desired at other sites in the body, outside the wound cavity, such reinforcement is desirable.

Table showing Blood Concentration of Sulphonamide Compounds following Local Application to Wounds

Nature of Wound	Dose (gm.)	Interval since Insertion (hours)	Concentration mg./100 c.cm. Free	Total
Sulphanilamide				
Sinus in buttock (first application) ..	2.5	6½	0.3	
		24	0.2	
Ditto: continuous packing over long period	2.5 (every 2 days)	24	1.2	
.. .. ..	2.5 (tablets)	24	0.55	
		48	0.28	
Two varicose ulcers, each 3 in. × 3 in. ..	2.5	4	0.25	
		8	0.4	
		24	0.5	
Raw area 6 in. × 3 in. from varicose ulcer	2.5	4	0.15	
		8	0.3	
		24	0.25	
Wound in buttock	5	6	2.0	2.0
		120	0.25	0.39
		148	0.2	0.2
Wound in thigh	5	24	1.3	2.5
		72	0.22	0.48
Sulphathiazole				
Sinus in buttock (same as above): continuous packing over long period ..	2.5 (every 2 days)	48	1.1	1.5
Compound fracture of radius and ulna ..	3.5	21	0.04	
Fracture-dislocation of knee	3	11	0.5	
Compound fracture of tibia and feet ..	4	23	1.2	
Laparotomy wound breaking open ..	3	27	0.35	
		46	0.25	
Wound in shoulder	2.5	22	1.1	1.9
Amputation of arm	5	35	0.49	1.3
Deep wound in brachialis muscle	2.5	14	1.2	1.2
Wound of laparotomy for tubo-ovarian abscess	2.5	64	2.1	2.0
		108	0.1	
Compound fracture of tibia and fibula ..	5	21	0.2	0.2
		45	0.24	0.24
Suprapatellar wound	5	21	0.68	0.68
		45	0.24	0.24
Carbuncle	3	48	0.12	0.12
Sulphapyridine				
Two varicose ulcers, each 2 in. × 1 in. ..	2.5	6	0.15	
		24	0.1	
Two varicose ulcers, about 2½ in. × ¾ in. ..	2.5	6	0.1	
		24	0.12	

Of the clinical effect of this treatment it may be said, briefly, that all the cases of fresh wounds and fractures progressed excellently, while the sinuses with chronic sepsis and the ulcers due to varicose veins appear to have improved. A more detailed account of the clinical aspect is given in a separate note on the application of sulphathiazole to wounds by Mr. Piercy.

Note on the Application of Sulphathiazole to Wounds

In the past four to five months all air-raid and street casualties with open wounds (the result of falling masonry and penetrating bomb fragments, and including tissues both lacerated and burned by incendiary bombs) have been treated after débridement and removal of foreign bodies by dusting approximately 5 grammes of sulphathiazole deeply into the lacerated tissues. These injuries include compound fractures and compound fracture-dislocations. In the latter cases the suture lines also have been dusted with sulphathiazole before the plaster is applied. If the loss of skin does not permit of suturing sterile vaselined gauze impregnated with the powder has been packed into the wound. The results have been highly satisfactory, the majority of the cases healing by first intention and the temperature falling within seven days—certainly a higher percentage than we found before this practice.

The following are two illustrative cases:

Case 1.—A young girl fell from a height on to the back of her hand, sustaining a compound fracture of the radius and ulna; both proximal fragments were forced into garden earth, which had displaced upwards, and replaced, approximately one and a half inches of the bone marrow. At operation the earth was curetted out and the medullary cavity was packed with sulphathiazole; this was followed by approximation of the fragments, suturing of muscles and skin, and application of a plaster cast. At the removal of the first plaster there were two small sinuses, which soon healed. Bony union is taking place.

Case 2.—A young man with a badly lacerated quadriceps muscle opening widely into the knee-joint was treated with sulphathiazole as above. A small rubber drainage tube, however, led down to the capsule of the joint. The skin was healed by the eighth day, but the small tube had disappeared, apparently into the tissues. Subsequently a search under gas failed to find it, and the wound was resutured. Following radiography, the wound was again explored six days later, and the tube was found actually in the knee-joint. In spite of all these manœuvres the wound healed perfectly, without any evidence of sepsis or sustained rise in temperature.

Summary

Patients with wounds, suppurating sinuses, and varicose ulcers were treated by the local insertion of sulphanilamide or sulphathiazole (up to 5 grammes). The concentration of sulphonamide compound in the blood after twenty-four hours was rarely above 1.5 mg. per 100 c.cm., and usually it was less than 0.5 mg. per 100 c.cm. Consequently it seems that this local treatment can safely be reinforced by oral administration of the compound, and that in many cases such reinforcement would be desirable.

Grateful acknowledgments are due to the superintendent of the New End Hospital, the Hampstead General Hospital, and the respective surgical staffs for permission and assistance in observing these patients; to Messrs. May and Baker and Burroughs Wellcome for supplying the compounds; and to Dr. A. T. Fuller and Miss M. Kuck for assistance with the chemical estimations.

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PNEUMOCOCCAL SEPTICAEMIA WITH RECOVERY

BY

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AND

S. ORAM, M.B., B.S., M.R.C.P.

Excluding the transient bacteriaemia of lobar pneumonia very few instances have been recorded of pneumococcal septicaemia, proved by blood culture, in which a cure has been obtained as a result of giving sulphapyridine. The case to be described presents sufficient unusual features to make it worth publishing.

Case History

The patient, an Army officer aged 39, was wounded on May 20, 1940, in Norway by flying bomb-splinters, and received a severe laceration of his left calf and a small wound below the left patella. No fracture was sustained. He was admitted to a Liverpool hospital, and the infrapatellar wound completely healed within six weeks. The calf wound was treated by débridement and plaster, and after four months the plaster was removed and replaced by elastoplast. Although this wound had not quite healed the officer was allowed to go home to the South of England as an ambulant patient on November 18. For the first five days of his leave he felt very well, but at midnight on November 23 he suddenly developed a rigor and much retching occurred. The following morning his temperature was 103° F. and a heavy cloud of albumin was present in the urine. A tentative diagnosis of acute pyelitis was made and appropriate measures were instituted. No dysuria was present. Early on the fourth day of the illness the patient noticed a slight sore throat, and this rapidly became worse. On November 28 he was admitted to our hospital.

On examination he was found to be nearly moribund, with a temperature of 106° F. A short time after admission a rigor occurred. His throat was almost uniformly injected, possibly slightly redder in the left peritonsillar region, but no membrane was present. There was a concomitant bilateral cervical adenitis. The calf wound was almost completely healed, but a little thick greenish pus was seen. No cellulitis was present and no crepitus was obtained. There was no tenderness over the kidneys or in the hypogastrium, and although his urine showed a heavy cloud of albumin and was strongly acid the guaiacol test was negative. The spleen was not palpable. The heart sounds were distant and tic-tac rhythm was present together with some degree of cardiac dilatation. The blood pressure was 108/76 mm. Hg. His other systems were normal.

Four 0.5-gramme tablets of sulphapyridine (M & B 693) were given immediately, followed by two tablets four-hourly.

Pathological Investigations

"*Throat Swab.*—Pneumococci predominate. Non-haemolytic and other organisms present.

"*Direct Smear from Wound.*—Pneumococci predominate. On culture pneumococci and a Gram-negative bacillus, possibly *B. friedländei*, were grown.

"*Blood Culture.*—Culture shows a pure growth of pneumococci.

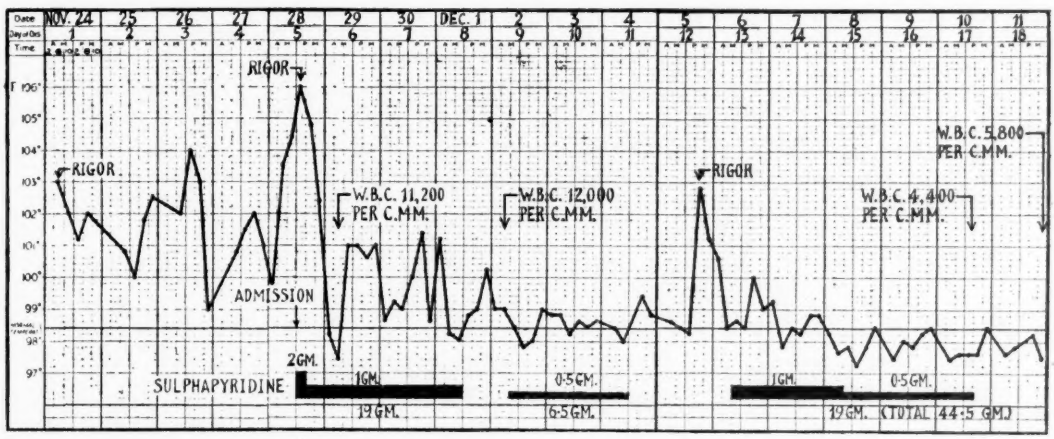
"*Urine.*—Acid reaction, albumin ++, sugar *nil*, acetone *nil*. Deposit: one granular cast, one or two leucocytes and epithelial cells, and a few coliform organisms, not in excess.

"*W.B.C. Count.*—11,200 per c.mm.—polymorphs, 87.2%; lymphocytes, 11.6%; basophils, 0.4%; eosinophils, 0.8%.

"*Radiograph.*—The contour of the left ventricle is suggestive of a degree of dilatation. The lung fields are normal."

Progress

On the morning following the day of admission a small swelling about an inch in length and half an inch in width suddenly appeared in the long axis of the inner aspect of the right forearm. It was red, tender, warm, and indurated. Local heat was applied and by the next morning no trace of this swelling could be found, but another swelling had appeared between the lower border of the thyroid cartilage and the suprasternal notch. This was more diffuse and more tender than its precursor, and extended beneath the left sternomastoid muscle. The overlying skin was red and oedematous but not adherent. No fluctuation was obtained. This was an acute diffuse thyroiditis. Antiphlogistine was applied over the swelling, which became more brawny during the next few days and then gradually disappeared.



By December 1, as the temperature had fallen to normal and the patient had received 19 grammes of sulphapyridine, an attempt was made to stop the drug, but by the same evening the temperature had risen to 100.2° F. A W.B.C. count the following day showed a total of 12,000 per c.mm., so sulphapyridine, one tablet four-hourly, was restarted. Two days later a second attempt was made to stop the drug. The day after doing so, however, the temperature rose to 102.8° F. and a rigor occurred, so a reversion to the original dosage was made. This time the drug was continued until the temperature had remained normal for three days. In all 44.5 grammes of sulphapyridine was given, and by now a moderate leucopenia had resulted, the white cells numbering 4,400 per c.mm.; by the next day this figure had already risen to 5,800 per c.mm. The albuminuria gradually decreased, and was quite gone by December 7.

Commentary

The heavy albuminuria and pyrexia with rigors suggested pyelitis, but that diagnosis was contradicted by the absence of appropriate clinical signs and of pus or organisms in the urine. The albuminuria presumably resulted from the fever.

As the pus from the wound yielded pneumococci, as did the throat and blood stream, it was thought that the primary focus was the calf wound, although six months had elapsed since the wound occurred and no history of recent trauma was obtained. It was considered unlikely

that the inflamed throat was the origin of the infection because this lesion followed four days after the raised temperature. Unfortunately no smear from the wound was taken soon after the injury.

Presumably the transient swelling in the forearm and the thyroiditis were septicaemic manifestations. The appearance of the thyroid closely corresponded with the description given by Giordanengo (1938), who states that only 54 cases of acute non-suppurative thyroiditis have been recorded.

During the administration of sulphapyridine no precautions were taken regarding sulphur-containing foods or drugs and no cyanosis occurred—in fact, the patient felt extremely well after the first few days and no nausea was experienced at any time. Radley Smith (1940) has shown how completely unjustified is the fear of administering sulphur-containing compounds during sulphapyridine therapy. The only substance which it is necessary to restrict, at least for the first few days, is water. This is often overlooked. It is impossible to obtain the optimum concentration of 10 to 15 mg. of sulphapyridine per 100 c.cm. of blood if the patient is allowed fluids *ad lib*. It is surprising that in such a debilitated patient the white cells did not become more greatly reduced. Young (1937) has stated that especial care is necessary in such ill patients, and has shown how inadequate a safeguard are frequent blood counts, since preceding counts often give no indication of the imminence of complete and fatal agranulocytosis. As it was, the total amount received by our patient was very near 50 grammes, which is considered by Sutherland (1939) to be dangerous. The individual susceptibility of patients must vary very considerably.

In all the cases we can trace there has been a delay of several days, due to difficulties in diagnosis, before the administration of sulphapyridine has been started. Bonorino Udaondo and Pinedo (1940) waited five days, and Southwood and Magarey (1940) did not begin chemotherapy till the seventh day, and in each case a cure was obtained. In both of these cases, as in our own, the drug was stopped too soon and had to be repeated.

Summary

The interesting features of this case appear to be:

1. The isolation of pneumococci from a leg wound, the throat, and the blood stream, and the long latent period of six months from the original wound to the onset of septicaemia.

2. The transient nature of inflammatory swellings in the arm and neck, which subsided without surgical intervention.

3. The relatively large amount of sulphapyridine (44.5 grammes) necessary to maintain a normal temperature, and the absence of any ill effects.

4. The long delay of four days before starting chemotherapy and the rapid and complete recovery of the patient.

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F. E. Norris (*Brit. J. Inebriety*, 1941, **38**, 112) states that the relation between alcoholism and crime is becoming an academic question and is now less important in the consideration of the causes of crime as a whole than formerly. Criminals in this country are not commonly addicted to alcohol and are not greatly concerned by its withdrawal after admission to prison. They rarely attribute their delinquency directly or indirectly to alcohol. In cases where there is a recognizable relation between alcoholism and crime the offences committed are only some types of sexual offences rather than the much commoner offences against property.

Clinical Memoranda

Amnioplastin as a Conjunctival Graft

This case is reported because we consider that amnioplastin has some advantages over mucous membrane grafts and possibly, too, over de Rötth's (1940) whole foetal membrane grafts, in that it is always available, is easily sterilized, and on account of its amorphous character lends itself admirably to conjunctival repair. Furthermore, it does not necessitate an additional wound at the graft source. It is suggested, therefore, that this might be a useful adjunct in the repair of civil and military eye wounds at the present time.

CASE RECORD

A quarry worker aged 54 sustained an injury to the strip region of his left lower lid by a fragment of stone in August, 1939.

When first seen, four months later, at the out-patient department of the Aberdeen Royal Infirmary he had a somewhat sessile mass on the middle of his lower eyelid conjunctiva measuring 7.5 mm. by 5.5 mm., and infiltrating the base of the lesion was a bead of dark pigment. Radiographs failed to reveal any foreign body, and no enlarged nodes were palpable.

It was decided, as a preliminary measure, to implant the area with radon seeds, giving 6,000 *r* at a distance of 0.5 cm. from the skin surface, and this was carried out on January 19, 1940. Biopsy taken at the time of implant showed the growth to be a malignant melanoma with an admixture of septic granulation tissue. Soon after treatment all the pigmentation disappeared, but at the end of five months, during which the patient was kept under close observation, a faint brown spot reappeared in the treated area and there was still some residual thickening of the centre of the eyelid. This was regarded with suspicion, and it was thought advisable to excise the lid. Actually no trace of malignancy was found in the tissue on microscopical examination following its removal, though metastases and secondary glands became evident before the end of the year.

On June 18, under evipan anaesthesia, the lower lid was excised medially as far as the lower punctum and inferiorly to beyond the lower fornix. Amnioplastin was used to replace the conjunctiva, being prepared and sterilized by boiling to obtain the maximum shrinkage before use, after the method suggested by Chao, Humphreys, and Penfield (1940). A flap of the membrane was sutured to the lower edge of the cut ocular conjunctiva and also to the skin at the lower edge of the wound, so as to make a deep fornix. The free end was then reflected upwards and sutured to the upper border of a pedicle flap from the left temple which was swung over to form the new lower lid. It will thus be seen that the lower lid was replaced and the space between the graft and the eyeball was lined by a double fold of amnioplastin.

During the next few days the only treatment carried out was the instillation of cod-liver oil drops into the eye and the covering of the whole wound area by saline soaks. Healing was satisfactory, and in just over three weeks the base of the pedicle was cut, the amnioplastin and graft having taken well.

When seen three months later some shrinkage of the artificial conjunctiva had taken place near the outer canthus, causing a symblepharon, which, however, has given no discomfort. The inner part of the fornix was of fair depth. No attempt had been made to prevent symblepharon during healing, as is commonly done, by passing a glass rod round the fornix.

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Reviews

HUMAN BIOLOGY

Human Biology. By George Alfred Baitsell, Professor of Biology, Yale University. (Pp. 622. 26s.) London: McGraw-Hill Publishing Company, Ltd. 1940.

The late Prof. Raymond Pearl advocated beginning the study of biology with the human frame rather than with progressive types of lower organisms, as is the more usual course. He gave some cogent reasons for this suggestion, prominent among which was the interest felt by the student. Prof. George A. Baitsell of Yale University does not take exactly the same view, as he is apparently content with the results of the ordinary method at the school level. For college students, however, he is "impressed with the necessity of supplying new and vital material at an advanced level for the basic courses." He finds that "the great majority of students beginning work in college biology were, inherently, far more interested in acquiring knowledge about the human organism than they were concerning any other living species," and "student interest in any subject is naturally expected to lead to increased endeavour." In *Human Biology* he has written a textbook for such students, and a most excellent textbook it is. He attempts "essentially a humanizing of general biology," and holds that "if the human biology material is presented from a comparative standpoint the student will learn not only the biology of man but also biology in its broader aspects, for man is a part of, not apart from, the world of life. . . . Organisms perform the same vital functions in essentially the same way."

It is important to realize this standpoint if the purpose, scope, and usefulness of the book are to be fully appreciated. It is an admirable textbook of human physiology, but it widens out in several directions beyond the usual content of such textbooks and, by doing so, illuminates and quickens interest in its subject. The several chapters on the systematic functions contain adequate, but not disproportionate, material relating to the relevant anatomy, histology, and comparative biology, both plant and animal. For instance, as the author says, "The study of human nutrition cannot be completed until the photosynthetic processes of the green plants and the decay processes of the colourless plants are brought into the picture." The full and clear exposition of enzyme action given in the book involves wide reference to organic catalysts concerned in every vital process. The human brain and heart can scarcely be understood without some description of these organs in less highly developed animals, and the account of human reproduction and heredity necessitates extensive reference to that in other species. In another direction, in chapters on the "Web of Life" and the "Biology of Disease," the author provides an introduction to parasitology, bacteriology, and immunology which is very valuable.

The book is easy to read and completely up to date. The numerous illustrations are of a most helpful kind. An unusual feature, perhaps unique, is an appendix of almost a hundred pages which contains paragraphs or short articles comprising further information, historical or expository, on many matters dealt with, or referred to, in the body of the work—for example, biological elements, enzymes, organic evolution. These are either direct quotations from authorities on the subject, or amplifications by the author, or in a few cases contributions by others. Incidentally the article on "Lymph" (more than one reference to which is given) appears to have gone astray. There is a good index. Altogether the work is so excellent and comprehensive that it should tend to become one of the most popular physiological and biological textbooks for medical students and others, here as well as in America.

A HANDBOOK FOR RADIOGRAPHERS

X Rays: Their Origin, Dosage, and Practical Application. By W. E. Schall, B.Sc.Lond., F.Inst.P. Fifth edition. (Pp. 252. 15s.) Bristol: John Wright and Sons, Ltd. 1940.

This very individual book is difficult to review, as it is of such uneven value. The close linkage of elementary physics with electrical engineering makes it an excellent textbook for the user of *x*-ray apparatus; the text is accurate and readable, and made clear by a wealth of simple diagrams. But there are some fifty plates of illustrations of finished apparatus, which serve no useful purpose, must add greatly to the cost of the book, and give it the appearance of a manufacturer's catalogue. The sections on the use of *x* rays in diagnosis are adequate, although the unevenness begins to appear in statements such as: "Gall-bladder—Iodine is used as the opaque medium, applied in the form of tetraiodo-phenolphthalein. The radiograph is made some eight hours after the iodine has been introduced." In the sections concerned with therapy the outline of subjects such as the absorption of *x* rays and the measurement of radiation dosage are perhaps sufficient for radiographers studying for the M.S.R., but the part dealing with clinical radiotherapy is so misleading that it were better omitted. The book thus pruned of those parts which properly belong to medicine might in its next edition return to its former size and maintain its place as an invaluable vade-mecum in any *x*-ray department.

DISEASES OF CHILDREN

Holt's Diseases of Infancy and Childhood. A Textbook for the Use of Students and Practitioners. By the late L. Emmett Holt, M.D., and John Howland, M.D. Revised by L. Emmett Holt, jun., M.D., and Rustin McIntosh, M.D. Eleventh edition. (Pp. 1,422; illustrated. 50s. net.) New York and London: D. Appleton-Century Company. 1941.

Since its first appearance, now nearly half a century ago, *Holt's Diseases of Infancy and Childhood* has been recognized as a standard exposition of current American views on paediatrics. The earlier editions by the late L. Emmett Holt and John Howland had a wide popularity, and the recent revised editions, the work of two distinguished products of the Johns Hopkins University and Harriet Lane Home—L. Emmett Holt, jun., and Rustin McIntosh—have continued to attract students and practitioners concerned with diseases of children. The eleventh edition, now available, differs from its predecessors in that a team of some thirty-four collaborators has been employed to carry out extensive revision and to provide much new material. Large portions of the book have been almost entirely rewritten, including sections on diseases of the newborn, nutrition, diseases of the blood, allergy, congenital heart disease, psychopathological problems, diseases of the bones, and certain of the infectious diseases. There is also a completely new section on diseases of the eye.

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that the inflamed throat was the origin of the infection because this lesion followed four days after the raised temperature. Unfortunately no smear from the wound was taken soon after the injury.

Presumably the transient swelling in the forearm and the thyroiditis were septicaemic manifestations. The appearance of the thyroid closely corresponded with the description given by Giordanengo (1938), who states that only 54 cases of acute non-suppurative thyroiditis have been recorded.

During the administration of sulphapyridine no precautions were taken regarding sulphur-containing foods or drugs and no cyanosis occurred—in fact, the patient felt extremely well after the first few days and no nausea was experienced at any time. Radley Smith (1940) has shown how completely unjustified is the fear of administering sulphur-containing compounds during sulphapyridine therapy. The only substance which it is necessary to restrict, at least for the first few days, is water. This is often overlooked. It is impossible to obtain the optimum concentration of 10 to 15 mg. of sulphapyridine per 100 c.cm. of blood if the patient is allowed fluids *ad lib*. It is surprising that in such a debilitated patient the white cells did not become more greatly reduced. Young (1937) has stated that especial care is necessary in such ill patients, and has shown how inadequate a safeguard are frequent blood counts, since preceding counts often give no indication of the imminence of complete and fatal agranulocytosis. As it was, the total amount received by our patient was very near 50 grammes, which is considered by Sutherland (1939) to be dangerous. The individual susceptibility of patients must vary very considerably.

In all the cases we can trace there has been a delay of several days, due to difficulties in diagnosis, before the administration of sulphapyridine has been started. Bonorino Udaondo and Pinedo (1940) waited five days, and Southwood and Magarey (1940) did not begin chemotherapy till the seventh day, and in each case a cure was obtained. In both of these cases, as in our own, the drug was stopped too soon and had to be repeated.

Summary

The interesting features of this case appear to be:

1. The isolation of pneumococci from a leg wound, the throat, and the blood stream, and the long latent period of six months from the original wound to the onset of septicaemia.

2. The transient nature of inflammatory swellings in the arm and neck, which subsided without surgical intervention.

3. The relatively large amount of sulphapyridine (44.5 grammes) necessary to maintain a normal temperature, and the absence of any ill effects.

4. The long delay of four days before starting chemotherapy and the rapid and complete recovery of the patient.

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F. E. Norris (*Brit. J. Inebriety*, 1941, **38**, 112) states that the relation between alcoholism and crime is becoming an academic question and is now less important in the consideration of the causes of crime as a whole than formerly. Criminals in this country are not commonly addicted to alcohol and are not greatly concerned by its withdrawal after admission to prison. They rarely attribute their delinquency directly or indirectly to alcohol. In cases where there is a recognizable relation between alcoholism and crime the offences committed are only some types of sexual offences rather than the much commoner offences against property.

Clinical Memoranda

Amnioplastin as a Conjunctival Graft

This case is reported because we consider that amnioplastin has some advantages over mucous membrane grafts and possibly, too, over de Rötth's (1940) whole foetal membrane grafts, in that it is always available, is easily sterilized, and on account of its amorphous character lends itself admirably to conjunctival repair. Furthermore, it does not necessitate an additional wound at the graft source. It is suggested, therefore, that this might be a useful adjunct in the repair of civil and military eye wounds at the present time.

CASE RECORD

A quarry worker aged 54 sustained an injury to the strip region of his left lower lid by a fragment of stone in August, 1939.

When first seen, four months later, at the out-patient department of the Aberdeen Royal Infirmary he had a somewhat sessile mass on the middle of his lower eyelid conjunctiva measuring 7.5 mm. by 5.5 mm., and infiltrating the base of the lesion was a bead of dark pigment. Radiographs failed to reveal any foreign body, and no enlarged nodes were palpable.

It was decided, as a preliminary measure, to implant the area with radon seeds, giving 6,000 *r* at a distance of 0.5 cm. from the skin surface, and this was carried out on January 19, 1940. Biopsy taken at the time of implant showed the growth to be a malignant melanoma with an admixture of septic granulation tissue. Soon after treatment all the pigmentation disappeared, but at the end of five months, during which the patient was kept under close observation, a faint brown spot reappeared in the treated area and there was still some residual thickening of the centre of the eyelid. This was regarded with suspicion, and it was thought advisable to excise the lid. Actually no trace of malignancy was found in the tissue on microscopical examination following its removal, though metastases and secondary glands became evident before the end of the year.

On June 18, under evipan anaesthesia, the lower lid was excised medially as far as the lower punctum and inferiorly to beyond the lower fornix. Amnioplastin was used to replace the conjunctiva, being prepared and sterilized by boiling to obtain the maximum shrinkage before use, after the method suggested by Chao, Humphreys, and Penfield (1940). A flap of the membrane was sutured to the lower edge of the cut ocular conjunctiva and also to the skin at the lower edge of the wound, so as to make a deep fornix. The free end was then reflected upwards and sutured to the upper border of a pedicle flap from the left temple which was swung over to form the new lower lid. It will thus be seen that the lower lid was replaced and the space between the graft and the eyeball was lined by a double fold of amnioplastin.

During the next few days the only treatment carried out was the instillation of cod-liver oil drops into the eye and the covering of the whole wound area by saline soaks. Healing was satisfactory, and in just over three weeks the base of the pedicle was cut, the amnioplastin and graft having taken well.

When seen three months later some shrinkage of the artificial conjunctiva had taken place near the outer canthus, causing a symblepharon, which, however, has given no discomfort. The inner part of the fornix was of fair depth. No attempt had been made to prevent symblepharon during healing, as is commonly done, by passing a glass rod round the fornix.

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Reviews

HUMAN BIOLOGY

Human Biology. By George Alfred Baitsell, Professor of Biology, Yale University. (Pp. 622. 26s.) London: McGraw-Hill Publishing Company, Ltd. 1940.

The late Prof. Raymond Pearl advocated beginning the study of biology with the human frame rather than with progressive types of lower organisms, as is the more usual course. He gave some cogent reasons for this suggestion, prominent among which was the interest felt by the student. Prof. George A. Baitsell of Yale University does not take exactly the same view, as he is apparently content with the results of the ordinary method at the school level. For college students, however, he is "impressed with the necessity of supplying new and vital material at an advanced level for the basic courses." He finds that "the great majority of students beginning work in college biology were, inherently, far more interested in acquiring knowledge about the human organism than they were concerning any other living species," and "student interest in any subject is naturally expected to lead to increased endeavour." In *Human Biology* he has written a textbook for such students, and a most excellent textbook it is. He attempts "essentially a humanizing of general biology," and holds that "if the human biology material is presented from a comparative standpoint the student will learn not only the biology of man but also biology in its broader aspects, for man is a part of, not apart from, the world of life. . . . Organisms perform the same vital functions in essentially the same way."

It is important to realize this standpoint if the purpose, scope, and usefulness of the book are to be fully appreciated. It is an admirable textbook of human physiology, but it widens out in several directions beyond the usual content of such textbooks and, by doing so, illuminates and quickens interest in its subject. The several chapters on the systematic functions contain adequate, but not disproportionate, material relating to the relevant anatomy, histology, and comparative biology, both plant and animal. For instance, as the author says, "The study of human nutrition cannot be completed until the photosynthetic processes of the green plants and the decay processes of the colourless plants are brought into the picture." The full and clear exposition of enzyme action given in the book involves wide reference to organic catalysts concerned in every vital process. The human brain and heart can scarcely be understood without some description of these organs in less highly developed animals, and the account of human reproduction and heredity necessitates extensive reference to that in other species. In another direction, in chapters on the "Web of Life" and the "Biology of Disease," the author provides an introduction to parasitology, bacteriology, and immunology which is very valuable.

The book is easy to read and completely up to date. The numerous illustrations are of a most helpful kind. An unusual feature, perhaps unique, is an appendix of almost a hundred pages which contains paragraphs or short articles comprising further information, historical or expository, on many matters dealt with, or referred to, in the body of the work—for example, biological elements, enzymes, organic evolution. These are either direct quotations from authorities on the subject, or amplifications by the author, or in a few cases contributions by others. Incidentally the article on "Lymph" (more than one reference to which is given) appears to have gone astray. There is a good index. Altogether the work is so excellent and comprehensive that it should tend to become one of the most popular physiological and biological textbooks for medical students and others, here as well as in America.

A HANDBOOK FOR RADIOGRAPHERS

X Rays: Their Origin, Dosage, and Practical Application. By W. E. Schall, B.Sc.Lond., F.Inst.P. Fifth edition. (Pp. 252. 15s.) Bristol: John Wright and Sons, Ltd. 1940.

This very individual book is difficult to review, as it is of such uneven value. The close linkage of elementary physics with electrical engineering makes it an excellent textbook for the user of *x*-ray apparatus; the text is accurate and readable, and made clear by a wealth of simple diagrams. But there are some fifty plates of illustrations of finished apparatus, which serve no useful purpose, must add greatly to the cost of the book, and give it the appearance of a manufacturer's catalogue. The sections on the use of *x* rays in diagnosis are adequate, although the unevenness begins to appear in statements such as: "Gall-bladder—Iodine is used as the opaque medium, applied in the form of tetraiodo-phenolphthalein. The radiograph is made some eight hours after the iodine has been introduced." In the sections concerned with therapy the outline of subjects such as the absorption of *x* rays and the measurement of radiation dosage are perhaps sufficient for radiographers studying for the M.S.R., but the part dealing with clinical radiotherapy is so misleading that it were better omitted. The book thus pruned of those parts which properly belong to medicine might in its next edition return to its former size and maintain its place as an invaluable vade-mecum in any *x*-ray department.

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thought and practice in America. The whole volume is well supplied with references, there are many valuable illustrations, and the index is good. Search in various sections chosen at random has revealed that the essential practical nature of the earlier editions has been well maintained. A curious omission discovered by chance is the absence of any reference to eumydrin for congenital pyloric stenosis. One other criticism is that the section on nutritional requirements appears to be very complicated and hard to read, probably because too much material has been condensed into a relatively short space. In general, however, this can be welcomed as a first-rate contribution to medical literature.

ELEMENTARY EXPERIMENTAL PHYSIOLOGY

Experimental Physiology for Medical Students. By D. T. Harris, M.D., D.Sc., F.Inst.P., Professor of Physiology, London Hospital Medical College. Third edition. (Pp. 292; 248 illustrations and plate in colour. 15s.) London: J. and A. Churchill. 1941.

The third edition of this book, originally based on the intermediate medical course in physiology at University College, London, continues the valuable service rendered by previous editions. Any student who follows it through will have obtained a good introduction to the methods used in physiological inquiry, and it can be recommended to any teachers of the subject as a basis on which to build courses suitable for their own departments.

The book contains several new features, notably a rewriting of much of the chapters on the analysis of the respiratory gases and of the blood gases. On the whole these chapters have been much improved, but it is unfortunate that the Van Slyke manometric apparatus is only mentioned incidentally, and then in the form of an elaborate modification which has found little general application. It receives no mention in connection with blood gas analysis, though the Van Slyke volumetric apparatus is described. The sections dealing with tissue respiration, with special senses, and with pharmacological experiments have also received notable additions and improvements. Some new electrical apparatus will please those interested in wireless technique—for example, a neon tube stimulator, thyratron stimulator, L.F. oscillator, amplifiers, etc., but it may be doubted whether the information given about them would be of any use to the inexpert. The figures are clear and well selected, the only thing to cavil at being that the commercial illustrations of apparatus are taken from too narrow a field of makers. The printing and general get-up are all that we are accustomed to expect of Messrs. Churchill.

VERTEBRATE HISTOLOGY

The Microscopic Anatomy of Vertebrates. By James I. Kendall, Ph.D., D.Sc. Second edition. Thoroughly revised. (Pp. 342; 197 illustrations. 17s. 6d. net.) London: Henry Kimpton. 1940.

The second edition of *The Microscopic Anatomy of Vertebrates*, by Dr. James Kendall, is a revision with additional illustrations of the previous edition. The original purpose of the book was to provide a practical knowledge of the microscopic anatomy of vertebrates, founded on representative types of the various classes. The material which has been made use of has thus been derived from such types as the dogfish, Necturus, lizard, pigeon, rat, rabbit, cat, or dog. References have been made to other types, where necessary, and certain facts of comparative anatomy have been introduced, which add to the general interest of a purely structural description of the tissues. The systems and organs have been dealt with in an orderly manner, which facilitates reference, but, as sometimes happens, the strict adherence to plan has in some places led to much repetition. The introductory chapters will be especially valuable in assisting beginners, by means of stereodiagrams placed side by side with photomicrographs of the same tissue, to interpret the different appearances produced by variations in the planes of section. The author has not attempted to do more than give a general description of microscopic anatomy, and has accordingly relegated the more detailed study of certain structures, such as the brain, sense-organs, or endocrine glands, to special works in which these subjects are dealt with from the standpoint of human or comparative anatomy, in a much more exhaustive manner than is possible in a textbook limited to a general survey of the basic principles of microscopic anatomy. The author has, however, provided for this contingency by giving a valuable selection of references to the literature on the several systems, which should prove to be an assistance to further study of the particular organs and systems. There is an excellent concluding chapter on the technique of preparing sections, which contains the practical information indispensable for the laboratory worker.

The book may be highly commended as an introduction to the study of vertebrate histology and as an incentive to further study.

Notes on Books

Like many another medical man, Mr. ANDREW RUGG-GUNN has fallen under the spell of Egyptology. In his *Osiris and Odin: The Origin of Kingship* (H. K. Lewis and Co., Ltd., 8s. 6d. net) he shows himself as an avowed "diffusionist" of the Elliot Smith school. After reciting the myth and cult of Osiris he maintains that in his migration northward this god became the Odin of Scandinavia. This view necessitated dating the introduction of Odin worship by many centuries earlier than is ordinarily done, but the author makes out a good case for so doing. A specially interesting contribution to his thesis is the map showing that the route of this migration was used on a return journey by the traffic from Jutland of the "life-giving" amber to Apollo's island of Delos. But more than amber took this journey, for if Mr. Rugg-Gunn's view is correct, Osiris, transformed into Odin, must have come back again as Zeus, accompanied by other northern deities who were established on Olympus when the Achaeans from the north invaded the Mediterranean countries. This is a point, however, which he does not raise. Agriculture, kingship, religion, form the tripod on which the Osiris and Odin cults alike rest. Mr. Rugg-Gunn traces our present discontents to the depreciation of those values, and makes an impassioned appeal for their restoration. Not everyone will agree with all the views expressed in this interesting book, but no one will question the author's deep sincerity. Incidentally a number of rather striking suggestions are made, such as that the present position in Italy is a revival of dual kingship, which has never been long in abeyance in the history of that country that in the United States society appears to be reverting to the matriarchal system, and that much of our coronation symbolism is drawn from the rites of Osiris. Altogether a pleasantly stimulating book.

A copy of the *Collected Papers from the Middlesex Hospital*, published during 1939–40, has been received from the cancer and general research committee of the hospital, and can be consulted in the Library of the British Medical Association.

For the sixteenth edition of the popular *Black's Medical Dictionary*, by the late Dr. J. D. COMRIE, extensive revision has been made and new sections on the ductless glands and on the sulphonamides added. The special wartime supplement on air-raid casualties which was included in the previous edition has also been revised in the light of practical experience. The publishers are A. and C. Black, and the price is 20s.

Preparations and Appliances

USE OF THE ROTARY PUMP IN INTRAVENOUS THERAPY

Mr. G. M. ARNOTT, resident surgical officer, Children's Hospital, Birmingham, writes:

The technique described below has in my opinion proved to be superior to the more common methods of administering fluid intravenously. The fluid can be given at an accurate speed, from a slow drip to a continuous stream under pressure, and is introduced by siphonage, making elaborate containers unnecessary. These advantages are effected by the use of Riddell's rotary pump.

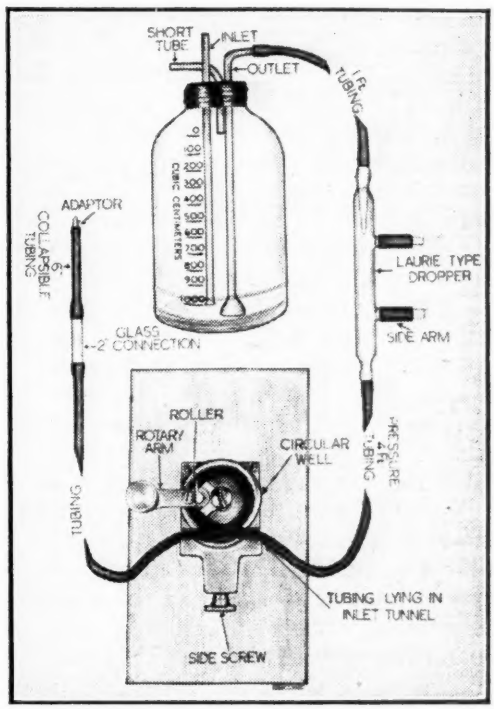
Mechanism of Pump.—The pump is constructed of metal and has an ingenious but simple mechanism. There is a "circular well," a section of which moves radially on turning the "side screw," either opening or closing the well. Within the well is the "roller," carried by the "rotary arm." By opening the well and manipulating the rotary arm the pump is easily charged with a turn of rubber tubing, the supply and delivery ends fitting in their appropriate tunnels in the wall. The tubing will lie with the wall of the well on its outer side and be compressed by the roller on its inner side. If the well is now closed, rotation of the arm will set the pump in action. A continuous wave of compression is exerted on the turn of tubing by the rotating roller, giving a positive pressure ahead and a negative pressure behind. When the rotary arm is in "neutral" the roller is opposite the centre of the movable section, and with the well closed the tubing is compressed and clipped off at this point. The lumen of the tube is re-established to any degree by turning the side screw and opening the well, providing an accurate drip-regulator.

Outfit.—The apparatus, which may be arranged as a portable unit, is assembled as follows (see diagram):

A wide-necked bottle, capacity 1,000 c.cm., containing the fluid to be administered, is fitted with a rubber bung, pierced by three lengths of glass tubing, two reaching to the bottom of the bottle and the third stopping short of the 1,000 c.cm. level. One long tube, the outflow, has its lower end shaped like an inverted thistle funnel, diameter 3/4 in., to act as a filter when covered with a few layers of sterile gauze. The second long tube is the inlet when taking blood or using filtered oxygen as an agitator. Pressure is equalized through the short tube, which is open in all procedures.

To the outflow are connected in series: (*a*) 1 ft. of rubber tubing. (*b*) A glass dropper of the Laurie type. The bulb should be 1/2 in. to 3/4 in. in diameter and about 6 in. long. If the column of fluid in the bulb tends to rise and obscure the point of the dripper the tubing above is clipped and a side arm on the bulb opened. When the required fluid level is reached the side arm is closed and the drip restarted by releasing the tubing. (*c*) 4 ft. of pressure tubing, outside diameter 9/32 in. This type and size of tubing must be used in the pump, which is threaded with this length. (*d*) a 2-in. glass connexion. (*e*) 4 in. of collapsible tubing. (*f*) An adaptor. All adaptors, cannulae, and needles should be of standard Record fitting, preferably with bayonet catches.

Venepuncture and Venesection.—Both in emergency work and in infusions lasting up to about six hours venepuncture is the procedure of choice if the veins are suitable; otherwise venesection must be performed. In either case an appropriate head of pressure is obtained by placing the container 2 to 3 ft. above the vein. The siphon is established with a clear fluid, an important point in performing venepuncture. If blood or plasma is to be given the bung is removed from the container and the filter immersed in saline, which is pumped through the tubing until all air is expelled and an even flow comes from the adaptor. The dropper meanwhile is held upright to obtain a suitable level of fluid in the bulb. When this has been completed the pump is stopped and the bung, if removed, is replaced in the container, care being taken not to shake the tubes and introduce air-locks. The container is placed in position. In venesection the adaptor is now attached to the cannula and the flow started by slowly rotating the arm of the pump two or three times, finally stopping in neutral. The drip will start and its speed be regulated by relaxing the side screw. In venepuncture the needle is attached to the adaptor while the siphon is being established and the bung fitted in the container as before. The skin over the chosen vein is prepared and, steadying the vein between the second and third fingers of one hand, the needle, held in the other hand, is introduced under the skin.



The rotary arm is reversed a few turns and the collapsible tubing will deflate. The operator watches the glass connexion, and when the vein is entered the reflux of blood will at once appear in the window. The needle is strapped in this position and the infusion started as before. Temporary distension of the vein will facilitate the operation, and in difficult cases a very small skin incision may prove helpful. A No. 16 S.W.G. needle with a short sharp bevel is used.

Advantages of the Method.—The advantages of having the pump in the circuit can now be considered. All drips are prone to slowing or stopping, and if a rapid inspection reveals a correct head of pressure, no obstruction in the filter or tubing, and no external pressure on the vein, the hold-up is in the cannula, the most frequent site. The difficulty is overcome by closing the well and pumping through a few cubic centimetres, which will clear the cannula, and the drip can then be restarted. During a drip infusion a few turns of the pump hourly will give an even flow. In slow drips the accuracy of a volume control can be maintained only by keeping the inlet clear. With the one apparatus fluid can be given at any desired speed, and the rate of flow can be accurately maintained. Plasma is now being more widely used, and the pump simplifies this type of therapy.

Taking Blood.—Finally, the outfit provides a simple method of taking blood and renders this operation possible under most conditions. The technique is the same as that described for venepuncture, the dropper being excluded and the pumping reversed. The citrate is pumped into the container through the long straight tube, the vein is entered, and the blood is withdrawn in an even flow.

"Varistab": Corrigendum

By a slip of the pen the name of Messrs. Boots's new product "varistab" was misspelt in our issue of March 15 (p. 406).

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DISTRIBUTION OF AIR-RAID CASUALTIES

Recent correspondence in the *Journal* has drawn attention to a problem that has been exercising the minds of those responsible for the treatment of air-raid casualties in hospitals—namely, the delay in the treatment that occasionally occurs owing to the fact that one hospital is overloaded with work whilst another closely adjacent remains empty and idle. That this is not in the best interests of either the injured or those who have to treat them will be disputed by no one. It is not, however, clear how far this experience is general, nor is it easy to determine the causes of this inequality of distribution or, having determined them, to find a remedy that can be applied easily and quickly. It is one thing to draft a perfect scheme on paper and quite another to follow out in the actual conditions of a raid the details that appear so clear and simple on a cool page of print. The ambulances that arrive at an incident have to work in darkness and danger and in the expectation that their journey to one or more hospitals may be blocked as a result of bombing. Once, therefore, a clear path has been found leading to one particular hospital, it is only natural that subsequent journeys should be made along the same path unless orders are given to move off in other directions. Again, the pride of service which is characteristic of the voluntary hospitals of this country makes the hospital staff eager to take in more and still more cases, and reluctant to admit that its capacity is becoming overstrained. As a well-informed correspondent points out (p. 526), the ideal system for surgeon, physician, and patient would be for all the casualty services to work under the same direction as the hospital service. Control in any given district should have absolute authority during a raid to direct the activities of the varying components of the casualty services. Control should be the central co-ordinating nervous mechanism, receiving messages from the outside and, after quick use of its association fibres, issuing clear instructions for action. To what extent has Control this power, and to what extent is it inhibited from using it? How far is conflicting authority responsible for lack of co-ordination between the casualty services and the hospital? These questions should be asked and be answered, for there can be no doubt that the time that elapses between the sustaining of the severe injury and its treatment is one of the most important factors in determining recovery. Within six to eight hours, as our correspondent points out, bacteria in a wound can be effectively dealt with by the customary surgical toilet. We would not be thought to detract from the admirable and heroic work that has been done in rescuing and treating those who have been injured in circumstances that are without precedent in our history, nor would we suggest that the bad results of delayed treatment are on anything but a small scale. But apart from the human aspect, the quicker and more efficient treatment of, say, 10 casualties in every 100, and the possible saving of one additional life in a hundred, is something that everyone concerned in the casualty services must aim at and achieve, by tightening up the system that exists until it is as nearly perfect as we can make it. The principles upon which the taking in of stretcher cases is based and their bearing upon ambulance arrangements are being carefully studied by the Ministry of Health, and will no doubt be embodied in future instructions. The distribution of casualties from major incidents should then be carried out in a more satisfactory way.

Until a complete co-ordination of casualty services does exist, the hospitals must themselves take steps to ensure that no casualty receives treatment too late because of faulty organization or because of reluctance to admit that it can no longer deal with additional cases with the existing staff and equipment. The officer in charge of a hospital during a raid should make every effort to anticipate the moment when the burden of work will become excessive, and should send out well in advance of that moment a call for the help of a relief surgical team. It is obviously not possible for him to turn away casualties once they arrive in the hospital, but it is unfair to both the hospital staff and the patients to hesitate to ask for assistance. If, owing to faulty organization, the casualties are all sent to one hospital while a near-by hospital remains empty, then the only thing to do is to ask the latter to supply an additional team. There is no virtue in delaying to seek for such help, nor, we feel sure, will there be any lack of response. The visiting team, however, cannot be expected to give its services willingly or efficiently unless the fullest preparations have been made for receiving it, and it is the responsibility of officers in charge of casualty hospitals to see that preparations are made down to the last detail, with a clear conception on the part of everyone of their duties in assisting and informing the visiting team of all the routine matters of their own hospital with which they are so familiar. Many hospitals, of course, have well-devised emergency machinery smoothly running for this purpose. It remains now to see that every hospital reaches the same pitch of excellence. Before the full operating capacity of a hospital has been reached, for ambulances are still on their way, the moment comes for what has been graphically termed "switching," in order to divert the further flow of casualties to other hospitals. As the mechanism for switching still has flaws in it, there is all the stronger reason for planning the internal arrangements of the hospital with the care and thoroughness which the surgeon shows in his operative technique. This and many other points are described in the article at page 526.

There is one other aspect of the treatment of air-raid casualties to which brief reference may be made, and that is the provision of an alternative hospital service when bombing is so intense as to put out of action a large number of hospitals in the centre of a big city. In such circumstances it is obvious that use must be made of hospitals at the periphery of the town or in the country beyond it, and it will remain with Control to give the signal to divert all casualties to the second

or even the third hospital line of defence. For example, a factory district, railway centre, or dock area may be severely attacked, and it is not uncommon for one or more of the chief hospitals of a city to be situated in these areas and involved in the attack. If the damage is so great that the hospitals can no longer carry on, then the next hospital line of defence must come into action. Even if work is still possible at the bombed hospital in a dangerous area, conditions may be such that it is impossible or even imprudent to convey into it casualties from less dangerous areas of the city. Apart from the risks to the patients of such a course, there is also the risk to the personnel of the casualty services. In any event it would seem desirable for hospitals situated in dock or industrial areas to receive only casualties resulting from incidents in those areas, and not from the less vulnerable parts of the city, casualties in which should be moved to the peripheral hospitals. If all the hospitals at the periphery are themselves bombed, then the third line of defence, of auxiliary hospitals and buildings selected in advance as reserves, will have to be used, or provision may have to be made for the erection of huts or tents to serve as emergency accommodation. It is important that the working of the alternative hospital scheme or schemes should be familiar to main Control, Sub-Control, depots, aid posts, and ambulance officers, drivers, and attendants. Hospitals which have been bombed may nevertheless still have much of their essential equipment untouched, and some time ago instructions were issued that plans for its removal should be prepared. Transport difficulties in such circumstances can easily be visualized, and hospital authorities have been asked to consider in advance the minimum essential equipment and stores to be removed immediately if the hospital is to carry on in improvised buildings; a second list of less essential equipment should be ready, so that this can be moved later when transport facilities have improved. Many hospitals in the country already have these details worked out to the last safety-pin.

REHABILITATION OF THE INJURED

In the years preceding the war much attention was being given to the problems concerned in the restoration to working capacity of persons injured by accident. This was in part due to a growing appreciation of the economic wastage associated with dilatory and inefficient treatment of fractures, for in Great Britain, on a conservative estimate, some 200,000 fractures were being treated each year in peacetime. A comprehensive report by a special committee of the British Medical Association in 1935 was followed by the appointment of an Interdepartmental Committee of the Home Office and Ministry of Health, which announced its findings in interim (1937) and final reports (1939). There was unanimous agreement on the following principles: segregation of patients with fractures, continuity of treatment from the time of the fracture to the final stage of rehabilitation or reconditioning, and unity of control throughout the whole period of treatment. The Interdepartmental Committee in its final report stated that special "reconditioning" centres would be necessary for a minority of patients treated in organized fracture departments, and various schemes were suggested. It is generally agreed that the majority of patients with fractures—children, housewives, and sedentary workers—require no special rehabilitation other than that provided by the physiotherapeutic department of a hospital—for example, heat, massage, active exercises both individually and in classes, and, in certain circumstances, electrotherapy.

It cannot be emphasized too strongly that the process of preserving and restoring function (that is, rehabilitation) begins with the initial treatment of the fracture. On another page Mr. E. A. Nicoll rightly makes this point, and indicates in a highly informative article many useful ways of preserving maximum function during the period of immobilization until the fracture has united. There is, however, a small proportion of patients, particularly those suffering from industrial injuries, for whom the gap between the stresses of such remedial activities as a hospital massage department can provide and the stresses of full heavy work should be bridged by a final period of reconditioning treatment. The aim is to subject the patient through graduated work to the full stresses of his original occupation while under constant medical supervision. This constitutes the argument for the creation of rehabilitation centres such as the Midland Counties Rehabilitation Centre for Miners at Berry Hill Hall, the work of which is so clearly described by Mr. Nicoll. As he says, rehabilitation is not to be confused with vocational training, which is the quite different and numerically smaller problem of training in new work a man who is permanently incapacitated from following any work in his former trade. The results obtained at those highly specialized centres, each of which deals only with the injuries of a particular trade—for example, Berry Hill Hall (miners), L.M.S. Railway Hospital at Crewe (railwaymen), Albert Dock Hospital, London (sailors)—and each of which is run by a surgeon and team familiar with every kind of work in that trade, appear to provide very strong support indeed for those who urge the provision of such centres on a larger scale. It is still a problem how best to organize these centres. Should they be planned on a regional basis and each centre be available to serve all trades? Or should each large industry have its own centre or centres? The latter method is the only one so far adequately tested, and its success appears to be proven.

Many surgeons experienced in industrial injuries feel that rehabilitation is best effected through the medium of "light" work. There is no doubt that in certain circumstances this is an admirable method, and it has been employed with the happiest results for many years by Dr. O'Neill Sherman of the Carnegie Illinois Steel Trust. He is able to insist, as soon as he considers a man fit for any form of work, that suitable work is provided and that the man remains under his or his team's observation. Somewhat similar facilities are provided by a few industries in this country, but, as Mr. Nicoll points out, "light work if it is to be of any remedial value must be selected, supervised, and graduated by the surgeon, just the same as any other form of occupational therapy. In actual practice, light work usually terminates the surgeon's connexion with the case." Moreover, the ability of an injured work-

man to do "light work" provides more often than not an excuse for depriving him of a substantial amount of compensation without the provision of suitable employment. As the Workmen's Compensation Act stands at the moment it is often difficult to prevent the development of an anxiety neurosis, with resulting persistent disability for the injured workman. It is natural that a man with family responsibilities and dependent for his living on his own manual efforts should be apprehensive about his future capacity to earn an adequate living, and more comprehensive information on this problem would be welcomed from established rehabilitation centres. It is quite certain that malingerers and deliberate seekers after exaggerated financial compensation form a very small proportion of injured workmen. It is surely not outside the scope of legal ingenuity to alter the Workmen's Compensation Act so that anxiety of the type alluded to above should not be added to the physical difficulties of rehabilitation. No doubt appropriate suggestions will be made by the Royal Commission on Workmen's Compensation to which the subject was referred, and these, it is hoped, will ensure that the workman is able to take a more rational view of his injury.

Who should decide when the man is fit to return to work? It seems unfair that this decision should be left to one surgeon, however expert he may be. The present system appears more just to the workman, though the abolition of the undignified wrangling between the medical and legal professions in open court would be welcome. Would it not perhaps be better to arrange for an efficient medical committee to represent all interests, whose decision would be accepted by employer and employee as final? It is clear that rehabilitation centres on the present model have justified their establishment, and it is to be hoped that employers and workers, and their respective organizations, will continue united and co-operative efforts to prevent wastage of man-power and money which could well be used for other purposes.

MEDICAL USES OF RADIUM

The Medical Research Council's series of reports on the medical uses of radium has been interrupted by the war, and the majority of the radium centres have been unable to compile their usual statistical summaries of the results of treatment. Experimental work, however, is continuing, and reports of this have recently been summarized by the Joint Radiology Committee of the Medical Research Council and the British Empire Cancer Campaign.[1] At the Imperial College of Science and Technology the bombardment of a spherical shell of uranium oxide by neutrons from a radium-beryllium source at the centre of the sphere produced secondary neutrons in excess of the number of primary neutrons captured from the source. An attempt is now being made to start a chain reaction; by using these secondary neutrons it is hoped to get further neutrons by fission in excess of the number lost in the process. St. Bartholomew's Hospital is producing radio-active sulphur for biological investigations. Evacuation of the pre-clinical students to Cambridge has meant that the Cavendish Laboratory cyclotron could be used in this work, and the difficulty of detecting the very soft beta radiation of radio-active sulphur has been overcome. A knowledge of the metabolism of sulphur in the skin is likely to throw fresh light on the skin reactions to radiation. Thus the report from the Mount Vernon Hospital shows that soft *x* rays (117 kV) have a much greater effect than gamma rays on the tails of mice when equal physical doses are administered under identical conditions. The explanation may be that the photo-electric emission of sulphur produced by the soft *x* rays is six times greater than that produced by gamma rays. Both the Royal Cancer Hospital and the Radium Beam Therapy Research Centre have continued their work on the spatial distribution of radiation within the body. By the contour projector the dose at any point from any number of converging beams can be estimated, and the volume of tissue which is raised to any given dosage level can be defined. Taking the co-ordinates of any point and computing the dose from previously prepared charts is a more laborious method, but it has contributed materially to the improvement of the 10-gramme radium unit technique. The Radium Beam Therapy Research Centre has also made small condenser chambers of a mixture of bakelite and graphite, with a small addition of titanium, which are independent of wave-length over a wide range. As the chambers are easily made several hundreds can be used simultaneously in a Presdwood phantom for determining isodose charts.

The Strangeways Laboratory has shown that the effects of radiation can be quantitatively estimated by means of mitotic and degenerate cell counts. To obtain the best results when divided doses are used the second radiation should be given when the effects of the first exposure are wearing off. With the material used, the optimum spacing after an initial dose of 82 *r* was eighty minutes, but with an initial dose of 268 *r* the optimum spacing was found to be ten days. Thus the duration of the biological change would seem to be proportional to a very high power of the dose, a result which leads to interesting speculations. For example, as the lethal effect of radiation is always represented by a sigmoid curve, it has been difficult to imagine what happens to the few cancer cells which necessarily survive, even in a "cured" case, no matter how big the dose. If, however, the above proportions hold for large doses the effects of a dose of several thousand *r* may take years to wear off. It has been found by the same quantitative methods that gamma rays ($\lambda_{eff.} = 0.014$) are only half as effective on tissue cultures of chick fibroblasts as *x* rays ($\lambda_{eff.} = 0.107$, 0.150, and 0.363 A.U.), no difference between the three wave-lengths of the *x* rays being detected. Linking these results with similar studies on neutrons, workers have found that for ion densities above about 5×10^4 per cm. the biological action is independent of ion density, and that below this value it diminishes rapidly as the ion density decreases. Where, however, it is the outcome of a single successful ionization—for example, the lethal action on bacteria—it increases with increasing ion density. The same kind of explanation is put forward by the Edinburgh Institute of Animal Genetics for the fact that the production of gene mutations in the spermatozoa of *Drosophila* is independent of both the intensity and the fractionation of the dose of radiation. A gene mutation, like the bactericidal effect, is the result of a single successful ionization, and the total hereditary effect is thus directly proportional to the total dose received during the life of the cell. The relation between the life of a cell and that of the individual is not well known, but the results are obviously of importance to all whose work exposes them to radiation. The frequency of structural changes in chromosomes also depends only upon the total dose received, as no reunions of the broken pieces take place in the spermatozoon before fertilization; but as at least

[1] *Brit. J. Radiol.*, 1941, **14**, 1.

two chromosomes must be broken for a structural change to occur the effect is proportional to about the 1.5 power of the dose, approaching the square of the latter with very small doses. In ordinary cells, where there is no block to the fusion process like that existing in spermatozoa, some restitution of broken chromosomes will occur, so that division of the dose over a period of time will result in fewer structural changes. The maximum chromosomal changes will thus be obtained by concentrating the dose into a short period of time.

EFFECTS OF SEVERE CALCIUM DEFICIENCY

The general effects on the growing organism of deprivation of calcium have been known for some time, but the recent studies of Kleiber, Boelter, and Greenberg[1] have brought out many new and interesting facts. Young rats were given a diet containing only 9 mg. of calcium per 100 grammes of food but adequate in all other respects. The caloric value of this diet was about 5 calories per gramme, and it would supply a child of 5 years, consuming 1,500 calories, with only 27 mg. of calcium daily, or little more than one-fortieth of the normal allowance. The first noticeable effect of the deficient diet was on the growth rate, largely as a result of decreased appetite but also because of decreased efficiency in the utilization of food. The calcium-deficient animals showed no other outstanding symptoms for the first seven to ten weeks. Then a decreased sensitivity and reactivity could be noticed. After two months (corresponding to some five years in the life of a man) any or all of the more drastic symptoms made their appearance. These included prostration, paralysis of the hind legs, black faeces, and haemorrhages from the anus and from the toe-nail bed. There was also polyuria. The paralytic foot-drop of one or both hind legs was probably a secondary effect of haemorrhages in the central nervous system. Immediately after the onset of paralysis the animals were extremely sensitive to touch, but within twenty-four hours the surface of the body lost sensitivity. Prostration and paralysis could be induced much earlier by means of mild, short galvanic shocks. It is striking to note that in not a single instance did tetany appear spontaneously as a result of this uncomplicated calcium deficiency, nor could it be provoked by electric or sound stimuli. Yet the serum calcium level of the deficient animals was generally between 4 and 6 mg. per 100 ml., a concentration which is supposed to be responsible for "low calcium" tetany in animals after parathyroidectomy. The findings of Greenberg and his associates certainly support the view that besides calcium deficiency other factors are concerned in the production of tetany. In magnesium deficiency in rats the blood calcium level remains normal, yet the animals are hyperexcitable and any startling noise throws them into tetanic convulsions.[2,3] A large percentage of calcium-deficient animals succumbed shortly after spontaneous or induced paralysis. Haemorrhages, which may occur in nearly every organ of the body, were the conspicuous feature of post-mortem examination, and were seen in the lungs, brain, bladder, gastro-intestinal walls (especially in the duodenum), nail matrix, and peritoneal cavity. Massive haemorrhagic areas were frequently found in the gluteal muscles. In addition to these macroscopic findings, histological examination revealed haemorrhagic areas in the cerebrum, medulla, brain stem, about the choroid plexus of the third ventricle, in the lower right temporal pole of the brain, and, only occasionally, in the spinal cord. Boelter and Greenberg believe that the haemorrhages were due to alterations caused by the deficiency in the blood-vessel walls. Needless to say, the skeleton was very poorly calcified; the skull hardly at all, and paper-thin. Some animals developed unilateral cataracts. With the exception of calcium blood constituents were normal, and it is noteworthy that serum phosphatase was unchanged. (In milder forms of calcium deficiency the bony frame is chiefly affected, but in severe depletion interference with the extraskeletal functions of the element apparently comes to the fore.) A change of diet to normal was followed by immediate resumption of growth and gradual recovery, though in some cases the loss of use of one of the limbs remained permanent and the animal dragged its leg along as in man after hemiplegia. Injection of calcium salts was of no help at all for the reason that it invariably caused death within twenty-four hours. Necropsy showed rupture of the abnormally thin (right ?) ventricle of the heart in a longitudinal line from the base to the apex.

[1] Kleiber, Boelter, and Greenberg, *J. Nutrit.*, 1940, **19**, 517; Boelter and Greenberg, Ibid., 1941, **21**, 61, 75.
[2] *J. biol. Chem.*, 1932, **95**, 519.
[3] Ibid., 1938, **122**, 693.

URINARY ANTISEPSIS

Although the new urinary antiseptics have made it possible to control almost every case of urinary infection not due to gross obstruction or accompanied by severe renal damage, there is still some misconception of how these drugs should be used. It is imperative in the first place to identify the micro-organisms responsible. Infection by *Bact. coli* and other closely related organisms will usually respond with equal readiness to treatment with either mandelic acid or sulphanilamide. In *Proteus* infections mandelic acid is useless, because no amount of ammonium chloride will render the urine acid enough for this drug to act: *Proteus* breaks down urea to form ammonia, and if ammonium chloride is pushed in the hope of acidifying the urine the effect on the patient may be serious, while on the urine it is *nil*. This infection fortunately responds well to sulphanilamide, which acts even better in an alkaline than an acid urine. This indication is reversed for infections with *Streptococcus faecalis*, this organism being unaffected by sulphanilamide but amenable to treatment with mandelic acid. In mixed infections it may be necessary to use these two methods consecutively, first eradicating one micro-organism by the appropriate treatment, and then attacking the other. This has been the position since the introduction of sulphanilamide, but it has been both complicated and improved by the advent of sulphathiazole, a careful study of which has now been made by H. F. Helmholz[4] of the Mayo Clinic. This is the latest of a long series of investigations by which Helmholz has given precision and certainty to our knowledge of urinary antiseptic action. The method he has adopted is to obtain urine from patients taking the drug, estimate the drug concentration in it, add a known number of bacteria, and determine by quantitative culture after incubation whether they have multiplied (and if so to what extent) or diminished in numbers. It is perfectly legitimate to deduce from such experiments what will happen in the urinary tract itself. His experiments with sulphathiazole include over 2,000 such observations, using many strains of each species of bacterium and urine adjusted to three different reactions. As usual there is a good deal of strain variation in resis-

[4] *Proc. Mayo Clinic*, 1940, **15**, 651

tance, some strains of *Bact. coli*, for example, being killed by quite low concentrations, such as 25 mg. per 100 c.cm., while others require much more. The effect of *p*H on antiseptic action corresponds to that for sulphanilamide: *p*H 7.5 gives the best effect, and higher concentrations of the drug are necessary to achieve it at *p*H 6.5 or 5.5. The order of bacterial susceptibility to sulphathiazole in ascending order is *Ps. pyocyanea, Streptococcus faecalis, Bact. coli, Bact. aerogenes, Proteus*, and *Staphylococcus aureus*. The fact that staphylococcal infection is the most easily controlled of all is perhaps clearer evidence of the alleged effect of sulphathiazole on this organism than has been obtainable in other fields of therapeutics. It certainly represents the greatest advantage of this drug over others as a urinary antiseptic, for staphylococcal infections of the urinary tract do not respond with the same certainty as others either to mandelic acid or to sulphanilamide. Sulphathiazole has thus filled the last important gap, and these three drugs intelligently used should furnish a complete armamentarium. The increasing complexity of efficient treatment and the uses of laboratory control are illustrated by a peculiar feature in the behaviour of *Streptococcus faecalis*. This organism, unlike all others, is more readily killed by sulphathiazole in an acid than in an alkaline urine; the effect is best at *p*H 5.5. Fortunately the concentration of sulphonamide compounds attained in the urine by only moderate dosage is so high that such refinements as the accurate control of *p*H are superfluous except in the most resistant cases.

WHOOPING-COUGH PROPHYLAXIS

This "plague of the nursery and school" attacked 53,065 children in 1940 and 329 died from it. Since Gardner and others awakened British bacteriologists to the importance of the smooth haemolytic virulent Phase I of the bacillus of whooping-cough the chief problem has been to discover and perfect a method of consistently making a sound prophylactic vaccine. Some years ago this *Journal*[1] pleaded that the vaccine producer should be in a position to guarantee antigenic efficiency when he hands over a vaccine to the doctor. With growing interest paediatricians have watched the accumulation of figures showing that highly protective vaccines have at times been made and used. Kendrick and others[2] in Grand Rapids, U.S.A., recorded a 15.1% attack rate among 2,397 carefully watched unvaccinated controls, contrasted with a 2.3% attack rate among 1,815 inoculated children. Sauer[3] in Evanston observed 286 infections among 1,730 unimmunized children, while only 32 occurred among 2,453 of the vaccinated. McCullough[4] kept under observation ninety-seven inoculated children; of these, twenty-three were in intimate contact—for example, by kissing or drinking from the same cup—with children suffering from pertussis. None of the twenty-three developed the disease. Laboratory experiments clearly indicate that the way is open for making and testing a potent vaccine. J. C. Cruickshank,[5] in 1937, by alcohol precipitation and acetone extraction of a tryptic digest of *H. pertussis*, made a fraction that protected 90% of mice against a dose of bacilli which killed twenty-nine or thirty unprotected mice. Lawson[6] sprayed his living culture with a curved needle on top of the larynx of mice and killed 93%, whereas 93% of mice given vaccine made from smooth virulent strains withstood the same dose without harm. Lawson by his carefully controlled work may have rendered as great a service to the producer of pertussis vaccine as Grinnell[7] did to the typhoid vaccine maker when he showed in 1932 that many commercial typhoid vaccines made with unsuitable cultures did not protect mice. Lawson similarly tested samples of five commercial whooping-cough vaccines and found that two gave high protection to mice tested later with virulent culture, while three vaccines were inefficient. One of these was made by destruction of intact cells and one was said to contain detoxified toxin. We may now be confident that children can be protected by a properly made vaccine proved before release to be efficient, preferably by animal test, for Sauer[8] holds that assay by agglutination and complement fixation is insufficient. A number of weekly injections—from four to eight according to different workers—are necessary, and the number of bacilli injected must be large—about 80 to 120 thousand million. Reactions do not appear to be unduly irksome. Hopes have at times been raised that vaccine given early may shorten or modify the attack. Most workers, however, are of opinion that vaccine is useless after the spasmodic cough is well established, and there does not seem to be convincing evidence that any vaccine proved protective by animal test has any effect even in the early stages—nor on general immunological principles is this probable.

[1] *British Medical Journal*, 1934, **2**, 1109; 1938, **1**, 459.
[2] *Amer. J. Hyg.*, 1939, **29**, 133.
[3] *J. Amer. med. Ass.*, 1939, **112**, 305.
[4] *Bull. Brit. Columbia Brd. Hlth.*, 1940, 116.
[5] *Lancet*, 1937, **2**, 567.
[6] *Amer. J. Hyg.*, 1939, **29**, 119.
[7] *Amer. J. Dis. Child.*, 1937, **54**, 979.
[8] *J. exp. Med.*, 1932, **56**, 907.

HONORARY PHYSICIANS TO THE KING

The following have been appointed Honorary Physicians to the King for a period of three years: Sir Henry Bashford, Chief Medical Officer, General Post Office; Sir Weldon Dalrymple-Champneys, Bt., Deputy Chief Medical Officer, Ministry of Health; Dr. John Moorcroft McCloy, Chief Medical Officer, Ministry of Home Affairs, Northern Ireland; Prof. W. W. C. Topley, F.R.S., Head of the Emergency Public Health Laboratory Service; Dr. R. Veitch Clark, Medical Officer of Health, Manchester; Dr. William George Clark, Medical Officer of Health, Edinburgh; and Dr. James Ferguson, Medical Officer of Health, Surrey County Council.

The Annual Convention of the Canadian Medical Association will be held this year in June at Winnipeg, under the presidency of Dr. Gordon S. Fahrni, lecturer in surgery in the medical faculty of the University of Manitoba and surgeon to the Winnipeg General Hospital. Those who crossed the Atlantic for the combined Annual Meeting of the B.M.A. and the C.M.A. at Winnipeg in 1930 have happy recollections of Dr. Fahrni, and know him as a keen supporter of the ties between us and the Canadian profession.

This year's Annual Session of the American Medical Association will be held at Cleveland, Ohio, from June 2 to June 6. The A.M.A.'s centenary occurs in 1947.

The President of the Board of Education has appointed Dr. J. E. A. Underwood to be Senior Medical Officer to the Board in succession to Dr. J. A. Glover, who reaches the age of retirement on April 10.

LONDON UNDER AIR BOMBARDMENT: SOME MEDICAL ASPECTS

BY

V. ZACHARY COPE, M.D., M.S., F.R.C.S.

[In the introduction to a lecture delivered to the North of England Branch of the B.M.A. on March 6 Mr. Cope described the aerial bombardment of London, which started last September, and mentioned first of all some of its indirect effects upon the health of the community. The factors concerned were the disturbance of routine, shortened sleeping-time, poor ventilation at some of the places in which refuge was sought, and interference with essential services, especially water supplies owing to broken mains. Incidentally he expressed surprise that greater use was not made of rain-water collected in tubs or tanks from roofs, which would, of course, be less easily interfered with by enemy action. He also pointed out how conspicuously the enemy had failed in one of his evident objectives—that of interrupting transport services. One striking proof of this was that although some inconvenience was caused by road diversions and occasionally by a temporary and local dislocation on the railway, yet every morning during the bombardment the milk supply came punctually to the door of every citizen.]

Effect of Shelter Life upon Health

The health of many Londoners during the period of severe and prolonged attack from the air was affected by their stay for many hours at a time in protective shelters. It had been anticipated that shelters would be necessary, and many, though not enough, had been provided, but it was not foreseen that the continuous nature of the nocturnal attack would necessitate the provision of sleeping accommodation. In these places, for some weeks before bunks could be provided, people slept on improvised beds and in deck-chairs. One surprising complication was the onset in a number of cases of thrombosis of the deep veins of the leg and consequent oedema of the ankle and foot, due to the fact that a person reclining in such a chair is apt to have his legs press unduly upon the lower transverse bar. The thrombosis is brought about by the continuous pressure with relaxed muscles. Dr. Keith Simpson (1940) has pointed out a more serious sequel in the form of pulmonary embolism. The number of cases of sudden death due to this cause reported in the various London districts in September and October, 1940, was 24, as compared with only 4 in the corresponding months of the previous year. These cases of pulmonary embolism have disappeared since bunks were provided, and it is reasonable to conclude that there was a direct association between the two facts. It is possible that a further consideration of the mechanism of the production of thrombosis in such cases may furnish valuable information concerning the occurrence of post-operative thrombosis and embolism.

Another surgical complication directly attributable to the prolonged stay in shelters was the great increase in cases of retention of urine in old men. Cold and damp may have been contributory, but the main factor must have been the limited conveniences at first provided: opportunity could not be found to pass urine until the bladder was over-distended, and thereafter retention ensued. Such cases will no doubt occur less frequently now that the shelters are better equipped.

A method of prophylaxis which, we are informed, may be introduced into the shelters can be properly commented upon by a surgeon—namely, the provision that has been made for the wearing of masks to prevent the spread of droplet infection. We are told that half a million masks are ready to be distributed as and when required. Surgeons have long acted upon the view that infection can easily be transferred by means of the breath, and the wearing of masks is a routine in the operating theatre. The human nasal and pharyngeal mucosa is in some cases as susceptible to infection as an open wound, and I have often been surprised that physicians have not strongly preached, and by force of example demonstrated, that contagion of the common influenzal cold could be prevented by the wearing of an efficient mask. If in the shelter, why not in the work-room or office? Making the reasonable assumption that in Great Britain every year one million people lose one day from work as the result of a cold, the time lost from this cause annually would equal nearly 3,000 work-years. Would it not be worth attempting to reduce this time by mask prophylaxis?

The direct mental effects of the bombardment confounded the prophets. The predicted panic and mass hysteria did not occur, the plain fact of the matter being that the average British citizen, whether soldier or civilian, is brave and resolute, and when faced with danger preserves an equanimity and stability of mind which is in large measure responsible for the greatness of the nation.

The Casualty Lists

Another surprise was the relatively small number of casualties following upon bombardment. Pre-war estimates had mentioned anything from 30,000 to 150,000 as likely to follow one big raid. When the attacks were made they were certainly on a large scale, for on several occasions it was said that 300 or 400 bombers dropped their explosive loads upon the metropolis in one night; yet the number of casualties, while most regrettable, was on a much smaller scale than the most optimistic of prophets had ventured to forecast. The number for the country as a whole has been published, and we were told on one occasion that the casualties for London then comprised about four-fifths of the total. Since then the proportion has been less great because several provincial cities have had severe attacks. From the figures officially announced a rough estimate can be made that during the 100 days of intensive attack there was a daily average in London of more than 100 killed and more than 150 injured.

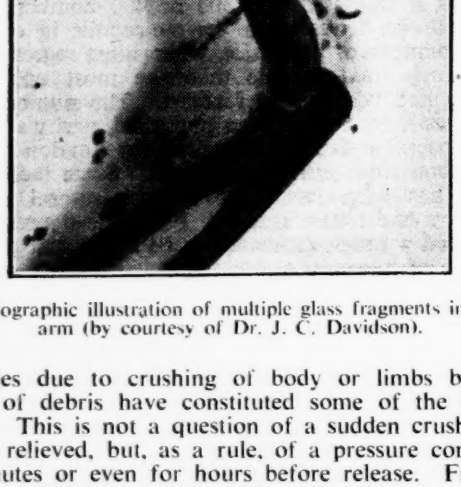
This comparatively small casualty list was not due to the fact that the people were all in shelters, for the majority still elected to sleep in their own houses, preferring, as one woman said, "to die suddenly in our own home rather than die a lingering death from 'shelter pneumonia.'" The striking feature of the casualty list, however, is the high proportion of fatal injuries. It was fairly constantly found that about 40% of those sufficiently hurt to be termed casualties had been fatally injured—a proportion much higher than in ordinary battle, and requiring some explanation. The explanation is to be found in the age and condition of the victims, the nature of the injuries, and the number of factors which may operate in one case. A battle is fought by young men in good physical health, but civilian air-raid casualties include the old and infirm, and the very young and sensitive. In battle a single bullet or part of a shell may cause considerable injury without hitting a vital part, while in air raids one vital part at least is likely to be damaged by the common crush injury. Again, when people are caught in the wreckage of a house many secondary missiles are formed by fragments of the building. In addition there are the dangers of asphyxia from burial in debris or from inhaling clouds of dust, the peril of poisoning from escaping gas, the risk of fatal burning in the ensuing fire or scalding by steam from broken pipes, and there is the effect of severe shock induced by the pressure of heavy and not easily removable structures pinning down the victim.

Wounds due to Glass: Crush Injuries

I cannot here describe fully the various types of wound and the complications that may be encountered. I can only emphasize some points in respect of which the injuries due to bombardment differ in kind or degree from those customarily met with in civil or in military surgery. These differences depend for the most part on the large proportion of crush injuries which result from falling buildings, on the frequent occurrence of severe effects of blast from high explosive, and on the injuries from secondary missiles, particularly from fragments of glass.

Injury from broken glass can be very serious. The force of an explosion often breaks all the windows in the buildings around the site, and glass fragments of all sizes

are propelled in every direction at great velocity. Glass easily enters the tissues, but is not as a rule infective. Large fragments may do serious damage, and may need to be removed promptly, but in some cases innumerable small portions may become embedded, the removal of which is impossible or inadvisable. Some of these cases have developed anaemia a few days later, and have required blood transfusion. Perhaps it may be assumed that there were multiple small haemorrhages caused by some of the deeper fragments. Recognition of glass in the tissues by means of radiographs is fairly easy (see Fig.).



Radiographic illustration of multiple glass fragments in the arm (by courtesy of Dr. J. C. Davidson).

Injuries due to crushing of body or limbs by great masses of debris have constituted some of the severest lesions. This is not a question of a sudden crush which is soon relieved, but, as a rule, of a pressure continuing for minutes or even for hours before release. Fractures of limbs, pelvis, or spine, which ordinarily cause a great amount of shock, will in these circumstances depress the vitality to the limit of endurance or beyond it. One form of spinal fracture which I have not seen in civil work is a horizontal fracture through the bodies of several adjacent vertebrae, with little or no compression and only slight forward displacement of one or other fragment of the fractured bodies. In one or two cases there had been no suspicion of a fractured spine until routine *x*-ray examination revealed the state of affairs.

Shocked Patients

As a rule there is no difficulty in recognizing that a patient is suffering from severe shock, but it is well to remember, what I pointed out as long as twenty years ago, that the classical symptoms of shock are not all present in any individual case. Recently Whitby (1941) and others, in a study of secondary shock as seen in air-raid casualties, have emphasized the same point of dissociation of shock symptoms. They rightly insist that the pulse rate may be dangerously misleading, that the mental state is no index to the severity of shock, and that the amount of sweating may be unrelated to the degree to which shock is present. I agree with Whitby and his colleagues that blood pressure is at present the most reliable measurable factor at our disposal for assessing the severity of shock, but I would add that in some cases the pulse pressure may be a better guide to the patient's condition. It may be that in the future we may obtain a better indication from the measurement of the blood volume or the specific gravity of the peripheral blood. A point not sufficiently recognized is that a degree of shock may exist before the systolic pressure falls, and that sometimes an apparently normal systolic pressure may coexist with a very serious state of shock. The most important lines of treatment for shock are rest, warmth, administration of morphine or omnopon, and the giving of plasma or blood transfusions, before disturbing the patient further by undressing, washing, taking radiographs, and, still more, by operative intervention.

Other Complications of Injuries

A new form of intestinal injury, caused by prolonged pressure on the abdominal cavity, has been discovered. In the case of a woman who lay helpless with a heavy beam pressing upon the lower part of the abdomen, subsequent exploration showed a state of peritonitis due to multiple points of gangrene in a coil of small gut lying in front of the lower lumbar vertebral bodies. Resection was carried out, but did not long delay a fatal issue. As there was no obvious lesion of the abdominal wall and no thrombosis of the mesenteric vessels, it is reasonable to conclude that the multiple points of gangrene resulted from the continuous direct pressure on the wall of the coil of gut. McMichael (in a personal communication) and others have recently described a very serious complication of severe crushes of the limbs in the shape of symptoms of profound shock accompanied by signs and symptoms of renal failure. Urinary output diminishes, vomiting and abdominal distension supervene, and the blood urea rises to a high level. In cases which came to necropsy extensive aseptic necrosis of the crushed limbs was found and the kidneys showed some tubular degeneration and blood casts in the collecting tubules.

The effect of blast is an important factor in air-raid casualties. The experiments of Zuckerman (1941) suggest that much of this effect may be due to the impact of the sudden pressure upon the exterior of the trunk, causing injury to the contained viscera. Surgically, the effect of blast on the abdominal cavity is of importance. Zuckerman, in experimental cases, has observed haemorrhage into the gut wall and even rupture of the bowel. Some confirmation of the experimental findings is given in the account by O'Reilly (1941) of five air-raid casualties which presented symptoms of acute abdominal disorder, and in which at operation some subserous haemorrhages were found but no major lesion. Mitchiner (1941) mentions a case in which he attributes rupture of liver and spleen to the effect of blast.

Clearance of Casualties

[In the last part of his lecture Mr. Zachary Cope recalled the inauguration of the Emergency Medical Service, the arrangements which were set up for distribution of casualties to hospitals, the division of London and the surrounding area into sectors, and the enlargement and equipment of outlying hospitals.]

The immediate medical treatment of casualties fell to the lot of the mobile units and first-aid posts. Doctors attached to mobile units were quickly on the scene of "incidents," and the work done by them in conjunction with first-aid squads has been in the highest degree praiseworthy. First-aid posts dealt with casualties as they were brought in, and the more serious cases were sent on to the nearest hospital. The view held by Trueta that first-aid posts should generally be in or attached to a hospital, where any necessary treatment can be performed, seems to have some support from London experience.

The effect of bombardment, with evacuation and blackout, was to diminish considerably the work of the general civilian practitioner. Patients did not throng the surgeries as in peacetime. Fewer beds were available in the central hospitals and many hospitals were hit by bombs, but a good out-patient service has been maintained. As for medical education, the pre-clinical students for the most part are out of London. Students doing hospital work have been distributed among the hospitals in the sector to which their medical school is attached. In some cases this has led to a closer relation between student and teacher, which is all to the student's good, but in certain instances regular teaching has not been easy to maintain.

In this rapid survey I have skimmed the surface of the subject; in due time many will write more fully of each

of its aspects. It is to the credit of the medical profession that its members, sharing ordinary civilian risks, stood to their posts of duty, which often involved great additional risks, with unflinching courage and resolution.

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For crush uraemia see also Bywaters, E. G. L., and others (1941). *British Medical Journal*, **1**, 427, 432.

PSYCHOLOGICAL TERMS USED IN CASES OF HEAD INJURY

A glossary of psychological terms commonly used in cases of head injury has been drawn up by the Brain Injuries Committee of the Medical Research Council (chairman, Prof. E. D. Adrian) and is published by H.M. Stationery Office as M.R.C. War Memorandum No. 4 (price 1d.). The object in view is to secure greater uniformity in case notes on such patients. Hitherto there has been no generally accepted definition of the words commonly used to describe the clinical effects of trauma upon the brain. The committee's notation, set out below, is already employed at the special centres for treatment of head injuries, and it is hoped that publication in this form may facilitate its adoption as a standard terminology throughout the medical services. The terms defined refer to the commoner psychological disturbances after head injury, but the list is by no means complete. The definitions are intended also to be useful for abbreviating description and for facilitating exchange of information between different observers. They are arbitrary and may not readily find universal acceptance; but since many of the words have in the past been used in varying senses, it seems essential, to avoid further ambiguity, that fixed definitions should be accepted and used. The prefix "traumatic" as used in this glossary denotes that the symptoms are due to the physical effects of head injury on central function; it may be added as a qualification to the appropriate term wherever applicable (for example, in "traumatic semicoma"), but its use should be obligatory for the terms to which it is attached in the list.

Glossary

COMA: A state of absolute unconsciousness, as judged by the absence of any psychologically understandable response (including, for example, change of expression) to external stimuli or inner need.

Note.—If a patient is comatose it is important to record the state of activity at levels of nervous integration lower than that which is the substratum of consciousness. Such activities are reflex—e.g., swallowing, pupillary and corneal reflexes, tendon jerks, plantar responses. It is not uncommon to hear it said of a patient who is comatose and cannot swallow that he is "deeply unconscious." This statement has no real value. He should be said to be comatose with loss of swallowing reflex.

SEMICOMA: A state in which psychologically understandable responses are elicited only by painful or other disagreeable stimuli—e.g., pinching the skin, shaking the patient vigorously.

CONFUSION (Clouding of Consciousness): Disturbance of consciousness, characterized by impaired capacity to think clearly and with customary rapidity, and to perceive, respond to, and remember current stimuli; there is also disorientation.

Note.—When a patient is said to be suffering from confusion the degree (see below) should always be specified.

Degrees of Confusion

Mild.—A state in which the patient, though presenting the characteristic features of confusion in some degree, is capable of coherent conversation and appropriate behaviour.

Moderate.—A state in which the patient, though out of touch with his surroundings, can be got to give relevant answers to simple questions such as "What work do you do?" "How old are you?" "Where do you live?"

Severe.—A state in which the patient, though for the most part inaccessible, will occasionally show adequate response to simple commands forcibly given and, if necessary, reinforced by appropriate gestures—e.g., "Put out your tongue," "Take my hand."

DELIRIUM: A state of much-disturbed consciousness (confusion) with motor restlessness, transient hallucinations, disorientation, and perhaps delusions.

TRAUMATIC STUPOR: A state in which the patient, though not unconscious, exhibits little or no spontaneous activity. In traumatic stupor there is always confusion.

TRAUMATIC AUTOMATISM: A state in which the patient, though capable of responding normally to his immediate environment, subsequently has amnesia for the period in question. In this state there is always some degree of confusion with disorientation.

CONCUSSION: A state of unconsciousness, or impaired consciousness, however fleeting, suddenly produced by mechanical force applied to the skull, and usually followed by retrograde amnesia.

TRAUMATIC DEMENTIA: Progressive mental impairment, predominantly of the intellectual functions, resulting from structural damage to the brain.

TRAUMATIC INTELLECTUAL IMPAIRMENT: Impairment of the intellectual functions which may be persistent or recoverable, but is not progressive, resulting from structural damage to the brain.

TRAUMATIC PERSONALITY DISORDER: Alteration of temperament and character which may be persistent or recoverable, but is not progressive, resulting from structural damage to the brain.

MALINGERING: Intentional simulation of symptoms.

HYSTERIA: A condition in which mental and physical symptoms not of organic origin are produced and maintained by motives never fully conscious, directed at some real or fancied gain to be derived from such symptoms.

Note.—The adjective "hysterical" may be applied either to this condition or to the type of psychopathic personality common among those who develop this condition, but it should not be applied—as is often done—to behaviour which is merely uncontrolled and emotional.

INSIGHT: Capacity for arriving at as objective and correct an estimate of any impairment due to one's illness as would be arrived at by a detached onlooker with equal access to relevant facts.

JUDGMENT: Capacity for arriving at reasonable conclusions, leading to well-adapted behaviour, especially as indicated by conduct in the practical affairs of daily life.

COMPREHENSION: Capacity to integrate diverse percepts and/or ideas and to understand the relation between them and one's personal experience.

AMNESIA: Impairment of memory, however caused. It is most commonly applied to incapacity to recall particular topics or the happenings of a particular period.

EPSOM COLLEGE ANNOUNCEMENTS

We publish the following announcements regarding vacant scholarships for girls and a pension for a doctor, at the request of the Royal Medical Foundation of Epsom College:

Scholarships for Orphan Daughters.—The Council of Epsom College will shortly proceed to award St. Anne's Scholarships to girls attending Church of England schools. Candidates must be fully 9 and under 16 years of age, and must be orphan daughters of medical men who have been in independent practice in England or Wales for not less than five years. The value of each scholarship is dependent upon the means of the applicant and the locality and fees of the school selected.

Pension for a Necessitous Medical Man.—The Conjoint Committee of Epsom College will in May next award a "Christie" pension of £89 per annum to a necessitous medical man, fully 55 years of age. Candidates must be duly qualified, and have been registered for five years.

Forms of application can be obtained from the Secretary, Epsom College, Surrey, and must be completed and returned by April 25, 1941, at the latest.

MEASURES FOR CONTROL OF LICE

In a leading article in the *Journal* of February 8 (p. 199) on lice and disease we referred to an investigation undertaken by Mr. Kenneth Mellanby at the request of the Minister of Health and the President of the Board of Education into the incidence in England of vermin infestation, particularly by head lice. The two Departments have now issued a joint memorandum to local authorities and their medical officers of health, which, after summarizing the scope and findings of the investigation, indicates the action which the authorities should take, and reminds them of the powers they have, to secure a reduction in the incidence of verminous conditions.

Findings of a Survey

Mr. Mellanby's survey, the memorandum states, was based on some 60,000 cases in hospitals—mainly infectious diseases hospitals—in industrial cities having a population of about 400,000, in rural counties, and in two Midland counties, one of which has a mixed rural and industrial population. It showed that: (1) a very high degree of infestation with head lice exists in the industrial cities, but that body infestation is rare; (2) girls are more frequently infested than boys; (3) the highest incidence is found in pre-school children; (4) the percentage of children infested is very low in rural counties; (5) in industrial cities infestation in girls reaches a peak at 3 years (51.6%) and remains round about that level until the age of 14, while in boys it declines steadily with age after the peak is reached in the fourth year; and (6) the percentages in the industrial cities on the average are three times those shown in the reports of school medical officers. These findings once more indicate, the memorandum continues, that it is to districts in which housing and social conditions are unsatisfactory that the main weight of any campaign to eradicate verminous conditions must be directed.

Education the Key

Mr. Mellanby concluded that education of the public was the only method likely to give permanent success, and the memorandum indicates the lines on which this should be undertaken. First, children once cleansed should not run the risk of reinfestation at home, and the public generally, but especially mothers, should be taught the importance of clean heads, not only to the health and comfort of the child, but to their own social credit. School children, particularly the girls, who will be the future mothers, should be taught the same thing, school teachers if necessary getting the help and advice of school nurses or similar persons. There should be a more thorough examination of heads in schools, and if school nurses cannot devote further time to this part of their work local authorities should consider whether it could be done by less highly trained persons under the supervision of the nurses. Advice should be given in articles and talks on health, and all persons known to be verminous should be told how they can rid themselves of the trouble and avoid it in future. Frankness and discretion are needed, because it is known that progress has often been hampered by attempts to conceal or deny the existence of a condition which may be regarded as detrimental to the individual.

Education authorities, the memorandum continues, already have the power to direct the medical officer of health or person authorized by him to examine any child at any elementary school and require the parent to cleanse him (in accordance with written instructions) within twenty-four hours, or, if the parent fails to do this, to remove the child for cleansing. Local authorities have power to provide cleansing stations, to cleanse persons applying to them and their clothes, and, in London, compulsorily to examine inmates of common lodging houses and order cleansing. The memorandum concludes by saying, however, that improvement will be secured not by resorting to compulsion, but by using to the full the administrative measures available for dealing with cases that arise, and preventing recurrence by intensive education of the public.

DISTRIBUTION OF AIR-RAID CASUALTIES

This article on the distribution of casualties to hospital is written by a surgeon who has recently visited heavily bombed cities.

For the person injured in an air raid the ideal medical service would be one which was conducted under one control from the moment the patient received his injury to the time of his return home completely convalescent. If such an arrangement were in force, it would not be difficult to decide the "saturation point" for any given hospital, the organization of ambulance services, the instructions to be given to drivers, and the delivery of casualties to the best advantage to all concerned. The present state of affairs arose because one part of the A.R.P. services is under the control of one Ministry and another part under another. The fire brigades and the police are, of course, the direct responsibility of the Home Office, and it was perhaps natural that the warden service, because of its semi-police functions, should come under the same authority, which also recruits and for the most part trains the rescue squads and stretcher-bearers. Decontamination squads are employed by local authorities. Local or scheme-making authorities—as, for example, the L.C.C.—were already before the war responsible for the ambulance services. The Ministry of Health controls first-aid posts and, indirectly, ambulances. Its contact with the first-aid parties is through the medical officers of health, who, while under scheme-making and local authorities, look to the Ministry for guidance.

Now experience has shown that rapid admission of casualties to hospital depends upon the co-ordinated effort of the entire A.R.P. service: a quick report by the warden; action by the police to clear the way for all services; priority for the fire brigade and the rescue squads; competent direction of first-aid parties by the incident doctor; skilful deployment of ambulances under the direction of the incident officer, and clear instructions to the drivers. This chain must be perfect in every link.

No one person at a single incident can have a complete picture of both this and the other events that may be happening simultaneously. Sometimes confusion may be so great that even Central Control may not be able to obtain a clear picture of the situation, but it alone can determine the best distribution of available resources, decide when to call for further assistance, and assume the ultimate responsibility for diverting ambulances from a hospital which is approaching saturation point.

Operating Capacity of a Hospital

With these facts in mind, and in the light of actual experience, it is now possible to consider the hospital problem itself. Originally the number of vacant beds was considered to be the measure of the capacity of a hospital, a conception that for some time dominated the organization of the ambulance service. Long before the beginning of severe air raids, however, surgeons pointed out that no more stretcher cases ought to be admitted to a hospital at one time than can be deliberately operated upon within six, eight, or, at the very most, ten hours, and the conception of what a hospital's capacity is was modified. Within the first eight hours bacteria in a wound remain, broadly speaking, "on" rather than "in" the living tissues, and are thus susceptible of removal by the customary surgical toilet.

How many cases can be dealt with on one table within ten hours or, preferably, within eight or six? It is safe

to say that in the last war, apart from the treatment of "walking" cases, the average table, continuously manned, did not operate on more than twenty-four cases in twenty-four hours. No doubt this number was exceeded on occasion, but it may be safely taken as the limit for the average theatre capacity. Thus a four-theatre hospital should not admit more than forty or fifty cases at a time (not all will need operation, so a margin may be allowed), and a two-theatre hospital twenty-five. When this capacity has been reached the hospital should "switch"—using the arrangements already existing and now to be codified—to ensure that further casualties are diverted to other hospitals.

Switching

The present mechanism for switching is complicated, and differs in different localities. The following methods have been employed. A hospital, when full, has simply shut its gates, stationing someone to advise arriving ambulances to go to the next hospital on the list and to report back to the Incident Officer. This method is open to serious misunderstanding and has led to bitter recriminations. Moreover, not all ambulance drivers have lists of hospitals to be used in succession as necessity arises. The Medical Superintendent or Medical Officer in charge of a hospital has made his contact in various ways. He has communicated by telephone with his Hospital Officer (in Region) or Group Officer (in Sectors). He has sent word to the nearest Report Centre, Sub-Control, Control, or to an ambulance group superintendent, or even direct to an ambulance depot. Messages have been sent to police, and even to fire-brigade, stations when it is known that they are close to a depot that cannot be reached direct. Hospitals have approached other near-by hospitals direct, and warned them that cases are being diverted to them. Unfortunately, telephones often break down, and though in some places the private police lines may be available when the general system fails, it is often absolutely necessary to use messengers. Messenger services have frequently proved quite inadequate. Whatever the system ultimately adopted, every hospital should know the procedure current in its own area, and meanwhile every method for utilizing the utmost capacity of its own resources should be known and practised.

Relief Surgical Teams

For instance, if all the available tables cannot be manned from the available staff, the assistance of visiting teams should be sought. These "supplementary" teams will have at their disposal all the routine facilities of the hospital—for selection of cases and their transport to and from the theatre, supplies of sterilized dressings, clothes, instruments, solutions, anaesthetics, etc. Alternatively it may happen that there are too many patients for the number of tables and that transfer is impossible. Then the visiting team may properly be summoned to "relieve" the original teams, who may tire before the work is completed. Or relief may be necessary when one raid rapidly follows on another and the regular theatre team has practically no rest between the two.

It is no use summoning relief teams unless the accessory services are in a condition to function. It is not only the surgeons, their assistants, and the theatre nursing staff who tire. All the active members of the hospital organization—the ward staff, the dispensers, the laboratory staff, the *x*-ray technicians, the linen-room attendants, the kitchen staff, the sterilizers, bearers, porters, clerks—all may have been overworked and require to be relieved. It has happened that visiting teams have arrived to find a whole staff exhausted, falling asleep, or actually asleep. Most hospitals have grown accustomed to sending requests for blood and plasma, but some of them still consider it a reflection on their efficiency if they make similar requests for sterilized dressings, surgeons' aprons, A.T.S., or sera and other supplies. All these can be made available in an emergency.

Preparations for Relief

It is important that the medical officer in charge of every hospital should, in times of stress, anticipate the moment when his organization will need rest, and that he should summon help well in advance of that moment. Matrons, too, should be ready to ask for relief nurses from a central pool or from another hospital. The medical officer should make sure that when surgical help arrives there will be enough still fresh members of his own resident staff for the rather delicate task of making the visitors at home with the routine of the hospital, and for giving all the help (and a little more) that they are accustomed to give their own surgeons and physicians. Visiting teams, which often arrive after difficult and sometimes dangerous journeys, have at times had cause to complain of their reception. It is true that they may not always have visualized the trials to which the visited hospital has been subjected; but more often than not they are of course fully aware what these are. Nevertheless, a visiting team has a right to expect to find a ready-made plan for its reception. Surgeons, housemen, and sisters will need to receive immediate instructions and information from their corresponding colleagues at the hospital. A member of the senior staff, perhaps a physician, should give the visiting surgeons full information about the patients who are waiting to be treated.

When continuous or severe raids lead to some inevitable disorganization, the more self-contained a visiting team is the better. In addition to anaesthetist, assistant, and sister, it is of great advantage if the team also includes students and/or auxiliary nurses, who can act as orderlies to fetch, carry, make inquiries, take notes, etc.; if it also arrives with its own instruments and sterilized supplies, so much the better. Before the operating theatre is available the relief team may be needed to help by examining admissions, selecting cases for priority, preparing them for operation, carrying out blood transfusions, undertaking immediate post-operative management of patients just off the table, and generally performing duties which normally are left to juniors. If two relief teams arrive simultaneously, one may offer the help just described whilst the other operates, with interchange of duties at a later period.

Further Points

The task of the visiting team is greatly simplified if the receiving hospital has set aside a reception ward adequately cleared for resuscitation. This should be possible in all but the smallest hospitals, and the value of such a ward has been so fully proved that the normal prescriptive rights of a surgeon over his own ward should not be allowed to stand in the way of securing a reception ward at all costs. Whether the hospital has one man always in supreme charge or not, the reception ward should be in the charge of a senior surgeon experienced, if possible, in war work at a C.C.S. If the work of the reception ward goes smoothly, then half the battle is won.

Clear plans, giving exact details, with names, dates, and hours, should be posted in every casualty receiving hospital in the country. During a raid the surgeon in charge of the team on duty should have complete charge of the hospital and be able to make use of any wards, whether they are under his care or not. The second team, with its surgeon, should be on call, while the third team, if not

required, should be available to send to the assistance of another hospital needing it. Visiting physicians and specialists and additional surgeons should all find some place in the composition of the teams.

The whole A.R.P. system is founded on the idea of mutual support. In general it has worked extremely well, but, as was to be expected, experience has revealed loopholes in the organization of various departments. As has already been stressed, the principal fault is failure to make preparations in advance down to the smallest detail, and this applies to the reception not only of relief surgical teams but of police, firemen, rescue and stretcher parties, ambulances, mobile units, and so forth, which have to be met, distributed, housed, or sheltered. Failure in preparation often means that the heads of the various services have, during their urgent duties in a raid, to be called away to improvise arrangements that should have already been made.

Hospitals that have adopted the principles outlined above and have perfected their plans have successfully undertaken arduous work under the most adverse conditions. When such hospitals put in a call to be switched, then their request will be accepted without question; when the hospital is once again ready to receive casualties it must inform Control of this fact. Here it might be added that no hospital should be reluctant to send out a relief team on the grounds that in their absence it might itself be damaged in a raid, as it is obvious that it will have its one or more basic teams in reserve.

The lesson of all this is that the work must be done at the spot where it is needed, no matter who does it.

AIR-RAID PRECAUTIONS

The February issue of the bulletin *A.R.P. Progress*, published by the National A.R.P. Co-ordinating Committee, 30, Bedford Row, London, W.C.1, summarizes recent progress in our preparedness against air attack and gives some useful information about gas—information which should certainly be more generally known.

Precautions against Gas Attack

The following are the main types of gas attack which may be expected: (1) Non-persistent gas or smoke released from planes either by bombs or by generators. (2) Persistent gas sprayed or scattered from low-flying planes, or dropped in containers. (3) Clouds of gas or smoke released from ships (this would be possible over the South-East and as far as London). (4) Gas from shells, tanks, or grenades if troops are landed.

Because the enemy is nearer, and especially because people have become careless about gas masks, such methods of attack are at present more likely to be successful than at the beginning of the war. They might be used to cause disorganization, since a heavy attack of mustard gas would compel wholesale evacuation from the areas affected, these areas remaining unsafe until they had been decontaminated either naturally or artificially. Alternatively gas might be used simply as a means of destruction and to bring about panic. As surprise would be an important factor, such an attack would be made in the first place on a large scale. The public cannot be too strongly urged to carry their masks with them wherever they go, especially at night, when a large-scale attack would be most probable. In the House of Commons on March 27 Mr. Herbert Morrison said: "The Government are taking fresh steps to ensure that every member of the population carries, practises with, and is in every respect familiar with the use of his gas mask. The authorities responsible for the periodic inspection of gas masks should be punctilious in their duties. Although in some areas inspection is frequent and efficient, there are some vulnerable parts of the country where it is not carried out at all.

The *Bulletin* advocates proofing all shelters and Tube stations. It is pointed out that large, well-designed shelters can be easily gas-proofed, whereas small ones are on the whole more difficult.

It is recommended that the following facts should be impressed upon shelter marshals and on the public: (1) that an ordinary room with windows shut and chimney packed gives considerable protection; (2) that the danger of suffocation in shelters from vitiation of air by breathing is negligible, since overheating of the air and panting would give ample warning; (3) that there is extreme danger of bringing liquid mustard gas or gas-generating substances into shelters or houses on boots and shoes; (4) that the civilian gas masks can be relied on.

Table Shelters

The National A.R.P. Co-ordinating Committee is unfavourably disposed towards the new indoor "table" shelters. The Government itself has said[1] that indoor sectional steel shelters would take up space increasingly needed by the bombed and homeless; that they "provide no additional protection against splinters beyond that which the walls of the room provide"; that they might well be driven through the floor or displaced by the weight of the collapsing house, or the exit from them might be blocked by falling masonry and those within might find themselves trapped and threatened by fire or escaping gas. The Co-ordinating Committee points out that these objections apply equally to the table shelters. Protection in them is below "code standard," since house walls are commonly of 9-inch brickwork, while the standard wall for a surface shelter is 17½ inches. Moreover, it is impossible to gas-proof these shelters. Most important of all, they use up steel which is badly needed for other purposes, particularly for the construction of heavy shelters.

The committee's criticism is not destructive only. It believes that an indoor shelter could serve a useful purpose in scattered areas where the communal shelter may be far from home. Home Security Bulletin C.14 describes a good indoor shelter with a cross-braced framework independent of the structure of the building, supporting a canopy which would catch falling debris. It is recommended that in any case windows and doors should be provided with baffle walls as a protection against splinters, that there should be an emergency exit, and that the room chosen should face soft ground to avoid damage from concrete which an explosion might throw up in splinters. A room prepared in this way could be used for other purposes.

While the new fire-fighting arrangements are justly praised, two dangers are emphasized—that of reduced output owing to the extra hours and strain, and the difficulty of protecting fire-watchers while they are on duty. Some kind of protection even against shrapnel and splinters would be a help.

The problem of fire-fighting, like the earlier one of utilizing the Tubes as shelters, has been met by sheer force of circumstances. But in less obvious matters—urgent though they may be—officialdom is still adopting, the *Bulletin* states, a blundering, half-hearted policy. The Board of Education states: "Damage to schools has been almost wholely confined to the hours of darkness when children are not at school, and this is a factor which is clearly relevant to the consideration of the type of protection to be provided." Building of shelters is still talked of as in some instances "impracticable," to be supplemented by the admittedly makeshift method of scattering school children to neighbouring houses during an alert. The Co-ordinating Committee, on the other hand, has prepared drawings of a modified "Haldane" shelter—classrooms by day, safe shelters by night. Drawings can be obtained from the committee at 1s. 6d. each post free.

[1] *Air Raid Shelter Policy*. H.M.S.O., Cmd. 5932. (2d.)

Local News

ENGLAND AND WALES

Country Branches of London Hospitals

St. Thomas's Hospital and Guy's Hospital are both opening country branches within the next few weeks, the former near Godalming and the latter near Sevenoaks. The country hospital of St. Thomas's will have 350 beds, about 100 beds being retained in London to meet emergencies; the out-patient department and various clinics will also be on the old site. The medical school will in the main follow the hospital into the country, the students being accommodated a few miles away in an old manor house. The hospital itself is built on the hutment plan, and nurses and other personnel will also, as a wartime measure, be lodged in huts. It is intended to have a special ward in which children suffering from air-raid injuries may be treated. The magnificent block of St. Thomas's, south of Westminster Bridge, which was opened by Queen Victoria exactly seventy years ago, suffered severely in the early air raids, and the damage to buildings and equipment has been estimated at over £1,000,000. Guy's has not actually suffered severe damage to the fabric, but surrounding property has been destroyed and the hospital income from property rents has dropped by about £12,000 a year as a result. A gift of $10,000 has been made by the American people for the equipment of the country branch, and it is hoped to commemorate this gesture in the name given to the hospital. The hospital in London will be maintained with 180 beds for civilian sick, apart from 200 reserved for air-raid casualties, and full out-patient facilities. If the hospital services should be seriously handicapped by further severe bombing in the neighbourhood an immediate switch-over will be made to the country branch. Both hospitals emphasize that this is not necessarily a wartime measure, but may be the beginning of a development of the large central voluntary hospitals to be continued after peace returns.

SCOTLAND

Polish School of Medicine in Edinburgh

A Polish School of Medicine was inaugurated at Edinburgh University on March 22, Sir Thomas Holland, Vice-Chancellor of the University, presiding. The school is being provided for the Polish Government by the Senatus of the University, and the first beneficiaries will be men who completed their studies in Poland but who, because of the war, did not sit for their final examination. The academic ceremony was attended by the President of the Polish Republic (M. Raczkiewicz), upon whom was later conferred the honorary degree of Doctor of Laws. Sir Thomas Holland referred to the occasion as unprecedented in the history of universities. Although wars and invasions had occurred in every century, he said, never before since the rise of universities five or six hundred years ago had these seats of learning in any country been ruthlessly destroyed as had happened during the present war in Poland. With the revival of learning in the Middle Ages the universities were founded as *studia generalia*, institutions to which scholars were welcome from all countries. Among the first to be founded was the University of Cracow [actually the oldest university in Central Europe, established in 1364], which had now been destroyed, but which would rise again as a nursery of truth for all peoples. He referred to the great names associated with the university, including, among the scientists, Copernicus and Marie Curie. Now in Edinburgh, around the nucleus of fewer than a dozen professors and forty-six students, there would grow up a Polish School of Medicine which, when it returned to its own land, would inaugurate a new era as the foundation faculty of the rejuvenated universities of Poland. President Raczkiewicz expressed his gratitude, and Prof. Sydney Smith, Dean of the Faculty of Medicine in Edinburgh, welcomed the fellow members of a great profession imbued with common ideals of service for humanity and a common quest for truth, to which a suitable reply was made by Prof. Jurasz, Dean of the Polish Faculty of Medicine. Later in the day a civic reception was given by the Lord Provost, when again the Polish President spoke. This new departure at Edinburgh has been the subject of negotiations for some time past. There are a number of Polish medical professors and lecturers in Scotland, some of whom were already professionally engaged in the laboratories of the University, and some Polish students, both men and women, have been attending classes.

Glasgow Municipal Hospitals

The Glasgow Corporation has unanimously approved a scheme proposed by the medical officer of health for the city whereby the municipal hospital facilities would be reorganized. The scheme provides for a change in the control of admission to hospital by granting the public health department powers to use these institutions for general treatment instead of confining their facilities to Poor Law patients. This important reorganization will complete the process of transferring all the municipal general hospitals in the City of Glasgow from Poor Law to public health control. Fifteen hospitals, large and small, are affected by the administrative change, which will take effect when the scheme has received approval from the Department of Health for Scotland.

Reports of Societies

DYSPEPSIA IN THE FORCES

At a meeting of the Section of Medicine of the Royal Society of Medicine on March 25, with Sir MAURICE CASSIDY in the chair, a discussion took place on dyspepsia in the Forces.

Colonel H. LETHEBY TIDY divided the subject under three headings: (1) peptic ulcer; (2) functional dyspepsia; (3) transient dyspepsia. Was the amount of dyspepsia in the Army larger than in civilian life? Payne and Newman investigating Army cases in the early part of the present war found that 92% of those affected had had symptoms before joining the Service; a more recent examination of the records of a hospital by Graham showed that of the patients with peptic ulcer 94% had shown symptoms in previous civil life. Only a trifling number of cases of peptic ulcer had developed in the Army. He drew attention to the great increase in dyspeptic conditions in the population generally during the last twenty years; he thought the profession had been somewhat remiss in not recognizing this increase. At the same time, relapses seemed to take place more quickly under Army conditions, owing partly to Army food and cooking. Army diet was more liberal and heavier than that to which the mass of the civil population was accustomed, and was undoubtedly a satisfactory diet to healthy men not previously subject to dyspeptic disturbances. As for cooking, there were deficiencies in the early months of the war, but it had been improved out of all knowledge, and still this rapid relapse of cases with organic dyspepsia occurred. He was convinced that these men would have relapsed just as surely whatever the diet and whatever the cooking. A menu chosen by Lucullus and a meal cooked by the chef of the Ritz would not have prevented relapse. Army routine was not compatible with the maintenance of continuous health in men who were subjects of chronic dyspepsia. It must be remembered that a relapse in the Army meant one thing and in civil life another. A man in civil life who felt any recurrence of his old trouble laid up at home for a day or two on a milk diet, but the man in the Army had to go into hospital and thus became officially a case of relapse.

Psychological Factors

Colonel Tidy next went on to speak of the psychological factor. The conclusion of some recent investigators was that in

the majority of these cases in the Army there was very little psychological disturbance. The cases of peptic ulcer seen in hospital tended to lose their symptoms with striking rapidity on dietetic treatment alone, and psychological disturbances did not appear to delay recovery. The kind of psychological factor which might be expected to operate was worry about business and separation from family; on the other side the men had the great relief of security of occupation. All the psychological factors operated in the last war (except large-scale bombing in this country), when the incidence of peptic ulcer and organic conditions of the stomach was reduced. The Registrar-General's returns of mortality showed, in respect of death from peptic ulcer, a flattening of the curve during the war period, the curve rising again after the war. There was no evidence that psychological or any other kind of disturbance increased the incidence of these conditions during the war.

Turning to the large number of cases of gastritis, Col. Tidy said that these, on the whole, were far more resistant to treatment than were those of peptic ulcers, and there was more likelihood of a psychological element in them. In the early months of the war it was supposed that these cases could be dealt with by marking the men down to a lower category, but they relapsed or their symptoms continued as definitely in category "C" as in "B" or "A." Yet many of them carried on and made useful soldiers. When they went back to their units it was the duty of the medical officer to keep them there if he could and for as long as he could, but if he failed they must go back to hospital. When these men had been twice in hospital they should be boarded out. They ought to have a second trial, and the medical officer should do all he could to keep them in the unit. He might, however, be faced with impossibilities. If a man vomited over the dinner table the M.O. was helpless, and it was astonishing how many of these men did vomit, owing to an unexpected appetite from the morning exercise and the temptation to eat a hearty meal.

Finally, there were the transient dyspepsias, which might affect healthy men on finding themselves in a very new environment. It often happened in the training centres that men reported sick with transient dyspepsia within a fortnight of joining the Service. If the M.O. was wise and experienced he would reassure them and give them a bottle of medicine (without the bottle they might be considered to be malingering). But if he was weak and inexperienced he would send the case to the hospital physician or a specialist, and if the latter lacked confidence he would admit the case to hospital. These men recovered or lost their symptoms very quickly and were sent back to their unit as "cured"; but they were not acclimatized, and soon the cycle started all over again. It was almost true to say that if a man was twice in hospital with the same complaint he was unlikely to develop subsequently into a useful soldier; he was converted into a case of almost incurable gastritis, and was actually more difficult to deal with than the cases of chronic gastritis in which the sufferers had over a course of years learned to deal with their disability. Cases of this group of transient dyspepsia ought not to be seen largely in hospital. It was extremely easy for medical officers—lacking rather in confidence than in competence—to magnify and multiply these cases.

Differential Diagnosis

Dr. CHARLES E. NEWMAN said that three or four definite problems came up for discussion. One of them was the diagnostic problem of distinguishing duodenitis from duodenal ulcer; the choice between these two seemed to depend upon the preference of the local school of radiological thought. But surely they were all accustomed in civilian practice to diagnose peptic ulcer with negative *x*-ray appearances. In a reasonable percentage of cases gastroscopy revealed an ulcer which was not seen by *x* rays. Occult blood in the faeces was a valuable guide, though not a valuable negative finding, in the diagnosis of ulcer. Another problem was the ascertainment of an organic as distinguished from a neurotic condition. Psychological factors were very important in the causation of gastric disturbance, but many people thought of them in a loose way. Worry was regarded as a psychological trauma, and yet it was the common lot. A girl who had an illegitimate child was put down as suffering from psychological trauma, though to a strong-minded girl it would be not a psychological trauma but a physiological event. The assessment of the psychological factor seemed to him often very superficial. In many of the organic cases there was a neurotic element. The person suffering from gastric ulcer was usually rather abnormal in his mind—as, for example, Thomas Carlyle, than whom a more rampant neurotic could not be imagined. What really mattered was to find out whether one or both conditions existed and to treat both if both were present. He pleaded for some settled order in the examination of gastric patients; otherwise everything depended on the view which the examining doctor took of such cases. For some doctors they had a fascination, others regarded them with impatience. Unless handled by someone who had an interest in them the patients were not going to get a "fair deal." For some reason the Army liked the diagnosis "gastritis." This was the predominant diagnosis of patients sent from the B.E.F. last year. Fifty years ago gastritis was well recognized as a common disease, but with the coming of more accurate means of diagnosis it became not only unpopular but the last gasp of the destitute. With the advent of gastroscopy "gastritis" was reintroduced, but it was still not possible to say what was the normal and what constituted a departure from it. There was such a thing as gastritis, but it was a rare disease, and the vast majority of patients who formed this difficult group in civilian practice were not really cases of gastritis at all. Recently there had grown up a tendency to describe dyspeptic soldiers as suffering from "soldier's stomach," rather on the analogy of "soldier's heart." It was a term that did not mean anything at all.

Major J. G. SCADDING described an investigation into 137 cases of dyspepsia in the Army. In the large majority of cases the symptoms had started in civil life. Of fifty-seven in the proved ulcer group only six had their first symptoms during Army service; forty-one had had no operation. There was some difference between officers and other ranks; of the ten officers included among the 137 cases, as many as seven fell into the proved ulcer group. The average age of onset in this group was 26; in fourteen cases the symptoms had arisen before the age of 20. There was complaint of vomiting in 30% of the proved ulcer group, though in none was it the principal complaint, but in seventeen of the remaining eighty cases vomiting was the principal symptom. The psychoneurotic element was very difficult to assess. In only nine was an obvious psychological abnormality detected. How far this psychological element was favoured by the advertisements of patent medicines must be left to the imagination. Some of these advertisements were masterpieces of reversed psychotherapy.

Incidence of Peptic Ulcer

Sir ARTHUR HURST mentioned some remarkable differences between the incidence of ulcer in soldiers and in civilians. In private practice duodenal ulcer was about four times as frequent as gastric ulcer, though in hospital practice this did not obtain (in three of the large London hospitals the statistics, both clinical and post-mortem, over a good many years showed an equal incidence of gastric and duodenal cases). In the Army, apparently, duodenal ulcers were in the large majority. During the last year, working at Oxford, he had seen almost every gastric case admitted to the Radcliffe Infirmary; more than half were admitted on account of haemorrhage, but he understood that haemorrhage was extremely rare (under 5%) in Army cases. He wondered to what extent radiological evidence might be misleading. He saw a patient 35 years ago with the classical symptoms of duodenal ulcer; he got well under medical treatment and had no recurrence. Recently he saw him again for lumbago, when the patient told him he had never suffered from indigestion for the last thirty years, but, to satisfy his curiosity, he persuaded him to have a skiagram taken, and the radiologist, who had been told nothing of the history, reported, "This man has duodenal ulcer." In how many soldiers was the old scar taken to mean an active condition? He wished there was some arrangement between the Army and the civilian hospitals for continuation treatment so that men discharged from the Army with these

conditions could be returned as soon as possible to civil employment. A great effort ought to be made to come to a conclusion as to which cases had gastritis and which had nervous dyspepsia. In true gastritis a considerable proportion of cases in hospital, on a strict diet and morning lavage, would get and remain well; the prognosis in true gastritis was quite good. He entirely agreed about the most undesirable way in which some of these dyspeptics were sent again and again into hospital. It was this kind of thing which during the last war gave rise to D.A.H. Cases of disordered action of the heart were comparatively rare in this war, but there seemed to be some risk of a new disease—" D.A.S."

Lieut.-Col. S. J. HARTFALL said that the incidence of a neurotic condition among the dyspeptic patients under his observation at the present time was about 60%. That did not mean that they were cases of neurotic dyspepsia, but there were quite a number which had ulcer—or had had ulcer previously—and had manifest neurotic symptoms associated with it. He also said that in a group of eighty-nine cases of dyspepsia with negative indications for organic disease on *x*-ray, occult blood, and test meal examinations, 60% were also entirely negative on gastroscopic examination, and 20% had a superficial patchy gastritis, sometimes fairly diffuse but not very serious—the sort of condition that would respond admirably to rest in bed with gastric lavage. The remainder showed positive findings and included some cases of acute gastric ulcer missed by the *x*-ray examination, and a larger number of chronic gastritis with atrophic or hypertrophic change.

Mr. R. T. PAYNE said that there was no doubt as to the dislike with which many medical officers viewed these gastro-duodenal cases. The sufferers were put down all too easily as malingerers. In some investigations which he with Dr. Newman conducted in the early part of the war very few malingerers were discovered. In that same investigation much evidence was found of surplus movement of patients between hospital and unit. Many mistakes in diagnosis were made owing to the ascertainment being left to the radiologist or to someone who had not the benefit of all the data. The gastroscope would help to elucidate some of the more difficult and obscure cases, though not all; it would help in particular to resolve the big group known as gastritis. He was inclined to quarrel with that word, and also with the large proportion of cases assigned to this group by various observers. Colonel E. B. MARSH spoke as a Regular Army physician whose practice in the Army dated back from before the last war. The first thing that struck him at Aldershot in the early days was that the age incidence in gastric cases (which he found to be 19 to 22) was much earlier than was stated in the literature (30 to 35). With regard to gastritis, he became accustomed to dividing the sufferers into two categories: the beer-drinkers and the bun-eaters. In the old Army days the beer-drinkers formed the larger group; now the bun-eaters were in the majority. He had never heard the term " soldier's stomach "; it was not an Army term. He added that in North-West India the young British soldier did not get ulcers, either duodenal or gastric. In five years in that part of the world he came upon no more than two cases.

Colonel TIDY, in reply, said that while the term " gastritis " was not of his invention, he thought it as good as any, and nobody had suggested an alternative. He deprecated the term " soldier's stomach." The cases which went back time after time to hospital were more aptly called " hospital stomachs " than " soldiers' stomachs." As to the proportion of duodenal ulcers to gastric ulcers, on looking up the returns at St. Thomas's Hospital for a recent year he found that more gastric ulcers were admitted than duodenal. In the Army the statistics varied between four or six cases of duodenal to one of gastric ulcer. Another term for which he had no use was " duodenitis "; he would include cases of this description for Army purposes (though not for scientific purposes) as duodenal ulcer. One radiologist would constantly diagnose duodenitis where another would diagnose ulcer. On the subject of malingering, he felt confident that the amount of malingering in the Army was practically negligible, but there was some exaggeration, especially among men who went into hospital over and over again. Such men were very unlikely to be useful soldiers.

EPIDEMIOLOGY OF PULMONARY TUBERCULOSIS IN THE ROYAL NAVY

At a meeting of the Section of Epidemiology and State Medicine of the Royal Society of Medicine on March 28, Surgeon Rear-Admiral S. F. DUDLEY introduced the subject of the epidemiology of pulmonary tuberculosis in the Royal Navy, especially as regards the use of miniature radiography in its elucidation.

He said that pulmonary tuberculosis had always been an occupational disease of sailors. From the beginning of the century until the present time the invaliding rate for pulmonary tuberculosis had fluctuated around 2 per 1,000. During a period in which, judged by mortality statistics, tuberculosis in England and Wales had been nearly halved, the prevalence of tuberculous disease in the Navy had remained unchanged. This was due to the factor of population density, which could not be eliminated or even reduced in the Navy. The purpose for which a warship was designed prohibited any increase of deck space per man, and more and more men were required to work the complicated machinery. A yearly incidence of 2 per 1,000 seemed to be the irreducible minimum. This was double the figure prevailing in the Army and the Air Force, although the Navy had a larger proportion of boys and men at those younger and older ages which in civil life showed a lower incidence of pulmonary tuberculosis than the average. The closeness of community life on the quarter-deck was the determining cause of tuberculosis among naval ratings. The yearly incidence among naval officers was less than 1 per 1,000, and they nearly always slept in separate cabins and their living accommodation was more spacious. When men were promoted to officers from the lower deck, the rate of tuberculosis among them dropped from 2 to 1 per 1,000.

Miniature Radiography for Mass Examination

All men in the Navy suspected of having pulmonary tuberculosis were at once examined by *x* rays. But it was the unsuspected cases which must be considered. Little effect on total incidence could be expected from the *x*-ray examination of recruits or limited numbers of contacts, and periodical examination by *x* rays of the total force by the usual technique was considered impracticable. Therefore mass examination by miniature photo-radiography had been introduced as a less cumbrous and expensive proposition, and the Lords of the Admiralty had given permission for the installation of the necessary apparatus and staff at the three main naval depots. Once the scheme was in full working order the chests of all men in the Navy would be examined at least once every three years. No man would be labelled tuberculous on the evidence of a miniature film until a full-size film had been taken; the function of the apparatus was to pick out as quickly and economically as possible the cases which showed abnormal shadows in the lungs.

Of the first 18,000 cases taken, about 7,000 of the subjects were trained men, the others being new entrants. The numbers re-examined and the results of the examination were as follows:

	Re-examined (Full-size Radiograph)	Percentage Re-examined	? Active T.B. (per 1,000)	Active T.B. Established
Trained men ..	269	4.0	31	4.5%
New entrants ..	403	3.4	38	3.2%

With regard to the ultimate effects of mass radiography as a preventive measure, they could only hope that if pulmonary tuberculosis in adults was generally due to fresh infection, by means of miniature photo-radiography it would be possible to reduce the risk of fresh infection so that it might soon become a rare event for tuberculous illness to be contracted on the lower deck of H.M. ships.

Surgeon Commander W. G. C. FITZPATRICK added some technical details. The work was done with a specially designed apparatus called the " pulmograph," carrying 35-mm. film. A light-proof tunnel connected the *x*-ray tube, the camera, and a screen on which the image was photographed. The film was exposed on deep inspiration, the exposure varying from

0.3 to 0.6 second according to the man's weight. A device was included for photographing the number of a card identifying the subject. After processing and drying, the film could be viewed by the naked eye, when any gross lesion could be detected, or as a projected image, when lesions were easily seen. About 200 exposures an hour could be made. Any case which showed any abnormality at all was sent for further examination.

Discussion

Surgeon Commander A. R. THOMAS referred to some work already done by various workers in mass radiography. De Abreu in Brazil had examined 14,000 cases, revealing lesions in 3.78%; also 10,000 cases among workers in food trades, revealing lesions in 3.4%. Berner of the German Army had examined 55,000 cases, all of them picked men (storm-troopers), and 1.5% showed tuberculous lesions. Jullien and others in France had examined 145,313 cases, not by photography but by the screen method, and the number of lesions found was only 0.18%. Dr. P. ELLMAN said that this was a unique method for the preventive medicine of the future. There was no doubt that when a patient with pulmonary tuberculosis was sent to a chest clinic with symptoms he was very likely (in 75% of cases) to have comparatively advanced tuberculosis. The problem was to deal with the asymptomatic case. Dr. W. M. CROFTON said that the figures given for incidence in the Navy were evidently reliable, but they ought not to be compared with the figures for the civilian population, which were unreliable. He had never understood why the subcutaneous tuberculin test had been given up. It was not a question of lighting up a dead lesion but of producing a condition of immunization.

Sir WILSON JAMESON said that one of the problems that must inevitably trouble them at the present time was the likelihood of the same unfortunate incidence of pulmonary tuberculosis in young adult females as occurred in the last war. The only thing that could be done was to endeavour to use some better method of diagnosis. The difficulty of using a method of this kind in relation to industry was that if large numbers of people in industry were examined and a certain number of them were found to be infected they must be stopped from working, whereupon their wages would cease and they would go on sickness benefit. This would happen to a great many people who were at present continuing in industry with their incipient tuberculosis. Nevertheless, this sort of examination was being carried out in a limited way in industry with the consent of employers and staffs. He understood that in the United States a camera of somewhat larger size was being used. That this method of examination should be introduced and pushed to the utmost he had no doubt at all.

Questions on the technique of the apparatus were asked by Dr. COCHRANE SHANKS and Dr. CRANCH, and Dr. R. CRUICKSHANK raised the question whether infected dust was not a greater danger than droplet infection in spreading tuberculosis on board ship or in confined spaces.

Surgeon Rear-Admiral DUDLEY said that, while such methods as these were by no means ideal, when it was a question of dealing with large numbers of men speed was essential. He did not agree with some complaint which had been made against the other Services on the ground that they were not trying the procedure. The method was on trial in the Navy; not all the people in the Navy were as yet going through this examination; and the Navy was the first in the field because the tuberculosis problem was much more a naval than an Army or Air Force problem.

SOME PROBLEMS IN ORTHOPAEDICS

The postponed 1940 annual meeting of the British Orthopaedic Association took place at Oxford on January 3, under the presidency of Prof. T. P. MCMURRAY. The meeting, which was well attended, was devoted to the presentation of short papers.

Fractured Neck of Femur, Late Results.—Mr. A. L. EYRE-BROOK and Mr. K. H. PRIDIE (Bristol) said that forty-seven patients out of a total of seventy-five treated by manipulative reduction and the insertion of a Smith-Petersen nail (Hey Groves technique) had been reviewed by clinical and *x*-ray examination at least one year after the procedure. Bony union was proven in 58% of patients, and in the whole series of seventy-five there had been a mortality of 5.3%. Aseptic necrosis of the capital fragment had occurred more frequently in patients under 30 years of age. The importance of the fracture-shaft angle of Pauwels was emphasized; if this angle was low (below 30°), the results from nailing alone were poor; a fibular graft should be inserted as well.

Excision of the Patella.—Mr. NORMAN ROBERTS (Liverpool) based his communication on twenty patients in whom the patella had been excised. He discussed the uses of the patella and emphasized the following points: (1) Recovery of function after excision is not so rapid as is often thought, though it is more rapid than after suture of the patella. (2) After excision, flexion movement is usually full or is possible at least to the right-angle; there is often a limitation of full extension and the quadriceps is often weaker than normal. (3) Excision is advisable in all comminuted fractures in both young and old patients, and in transverse fractures in middle-aged and old patients. (4) Transverse fractures in young patients should be sutured. If the fragments are markedly unequal in size it is easier to excise the smaller fragment and to suture the rectus or patellar tendon efficiently to the larger fragment. (5) Derangement of the knee due to recurrent dislocation of the patella cannot usually be cured by excision of the patella. (6) Good results sometimes, but not always, follow excision in osteo-arthritis of the knee, particularly if the arthritic changes are mainly in the patello-femoral compartment of the joint.

Correction of Scoliosis.—Mr. G. E. THOMAS (Liverpool) observed that in sixteen patients correction of the deformity had been achieved in the majority by recumbency on a Thomas frame with longitudinal traction and counter-traction applied via the head and legs and "three-point" pressure on the apex of the convexity and the extremities of the concavity. To exert lateral pressure special pads operated slowly by a screw mechanism of the Thomas wrench type were employed. Failure to achieve correction had occurred in very high and very low curves, in severe long-established curves, and in those cases in which there was gross rotation out of all proportion to the lateral curvature.

Fractures of External Tuberosity of Tibia.—Mr. W. S. DIGGLE (Liverpool) reviewed a personal series of these difficult fractures. For those cases in which there was gross comminution and depression of the fragments he had found open operation, replacement of the fragments, and screw fixation the most effective treatment. Most of his patients treated in this way had been able to return to work in about six months.

Compound Fractures of the Leg.—Mr. G. K. MCKEE (Norwich) advocated fixed skeletal traction on a Thomas splint for both tibial and femoral fractures, simple and compound. For tibial fractures a Steinman pin was inserted transversely through the upper tibial fragment and through the os calcis or the lower fragment. The pins were fixed firmly, after reduction by manual traction, to the lateral bars of the Thomas splint by a special clamping device. For fractures of the femoral shaft one pin below the fracture, fixed in a similar way to the Thomas splint was employed. To avoid undue pressure on the ischial tuberosity or groin the splint was tied to the end of the bed, which was then elevated.

Keinboch's Disease.—Mr. F. C. DWYER (Liverpool) considered that this peculiar affection of the carpal semilunar was probably due to a fibrosis, resulting usually from trauma, of the dorsal ligaments attached to the bone. From an experience of thirty-four patients, in ten of whom the damaged semilunar had been removed, Mr. Dwyer felt that conservative treatment offered the optimum results in a condition which in any event always resulted in a permanently damaged wrist.

Nerve Regeneration and Nerve Grafting.—Mr. J. L. YOUNG, M.A. (Oxford), outlined the preliminary results of experimental work now in progress at the University of Oxford on nerve regeneration and nerve grafting in rabbits. At the start he warned against too closely applying experimental findings to man, even though they had been very accurately demon-

strated in animals. The need for a qualitative method of comparison between different procedures for nerve repair was emphasized. The rate of growth of new fibres was adopted as a criterion and a method of estimating it developed. The rate for rabbits was found to be about 4 mm. a day, was the same in all nerves, and was approximately the same at all levels. Certain suture material occasioned severe reactions—for example, catgut and pigmented silk. White silk, woman's hair sutures, and fibrin "glue" produced the least reaction. Return of function was often rapid, and it was stressed that such rapid recoveries took place after full Wallerian degeneration—they were not due to "physiological interruptions" such as could happen after ischaemia but which cleared up even more rapidly.

Mr. Young pointed out that between interruption and recovery of a nerve's conduction there was delay at three points: (1) In the junction scar—probably about twenty days in man. (2) In the nerve itself during the growth of fibres down it. This was probably at the rate of 2.5 mm. a day in man. These two phases comprised the anatomical delay. (3) In the muscle—the functional delay—about forty to sixty days in man. The delay in the muscle seemed to be shorter if the muscle had been denervated for only a short time—a finding strongly in favour of early suture.

The problems of bridging gaps were discussed. It had been demonstrated that nerves could not be stretched suddenly more than 10% of their total length, and that increase in length from gradual stretching was probably due to actual growth in length of the nerve rather than to stretching. For grafting, autografts had given most success in rabbits, and there were some encouraging results from homografts.

SOME POINTS IN TRANSFUSION

At a meeting of the Shaftesbury Military Hospital Medical Society on February 18 Colonel L. E. H. WHITBY, in a paper on transfusion for war conditions, said that the modern employment of large infusions had rendered gum-saline and haemoglobin-Ringer solutions less generally useful, as in large amounts the former impaired the oxygen-carrying power of the red cells, and the latter might be dangerous unless the urine was kept alkaline. An objection to the use of serum was that it could not be freed from agglutinins and might cause reactions if given in large amounts. Citrated whole blood and pooled agglutinin-free plasma were the fluids adopted for general use by the Army, and would meet all requirements if employed with due regard to the physiological principles involved. In the case of air-raid casualties who had been quickly removed to hospital, post-haemorrhagic physiological changes were minimal: there was no dilution of the blood, the haemoglobin percentage was normal, and there was no secondary shock. In these cases plasma alone was required. Soldiers evacuated from a battlefield, however, would not have been in a position to receive treatment until blood dilution had occurred, and here the indication was for transfusion of blood, both to restore oxygen-carrying power and to combat shock; saline infusion in addition was most valuable for overcoming the tissue dehydration which these delayed casualties suffered, in that haemodilution took place at the expense of tissue fluid. In both cases the subjects contrasted with those commonly requiring transfusion in peacetime practice in that they had been previously healthy and had no cardiac disability; it was therefore safe to give at least two pints of blood or plasma quickly to anyone with a blood pressure consistently below 100 mm. Hg, and then to continue a slower drip-transfusion before, during, and after any operative treatment. If blood derivatives were being used, it was wise to give one pint of whole blood for every three pints of these.

The Trustees of the Bernhard Baron Decd. Charities Fund have sent the final instalment of £2,000 towards the promised £10,000 for a new maternity wing at the Royal Northern Hospital, Holloway. The projected building has had to be postponed until after the war.

Correspondence

Delay in Treatment of Air-raid Casualties

SIR,—I hope your post will bring you many more letters in support of Mr. Norman White's view (March 22, p. 459) that there is unnecessary delay in the treatment of air-raid casualties in London due to the present policy of sending all the casualties from a major incident to one hospital. Hospital authorities have shown some diffidence in referring this problem to their Sector Officers, and have indeed on more than one occasion recorded with pride that after a night raid they had operated till late the next day, while the staff of another hospital less than half a mile away had stood by doing nothing.

It is to be hoped that the Central Medical War Committee will bring strong pressure to bear on the responsible authorities to rectify this failing in an otherwise excellent medical service. The solution would appear to be a simple one—namely, that under present conditions no more than two ambulances should proceed from the site of an incident to any one hospital.—I am, etc.,

London, W.11, March 22. H. STEPHEN PASMORE.

SIR,—Mr. Norman White has raised an important point in your columns. He has shown that in London all the air-raid casualties from one "incident" may be taken to the nearest hospital, no doubt in a praiseworthy effort to obtain the quickest treatment, whereas another hospital at no great distance away may have no casualties at all. Thus there is delay in actual treatment. The same is the case on Merseyside. It has happened that hospitals in one district, sometimes actually damaged by bombing, have had more casualties than could be dealt with, while other hospitals in the same area, easily accessible by ambulance within a short time, quite undamaged and with an enthusiastic staff ready, have received not a single casualty from the whole raid. Experience has shown that many of these casualties require laborious and time-consuming treatment, and that, indeed, one case may require the work of a whole team. Such treatment cannot adequately be given when there is a great rush of cases, and may become impossible if supplies of water or electricity or the black-out become interfered with by enemy action.

Although the importance of early treatment, first shown in Spain, is now generally realized, it would seem that excessive regionalization in the disposal of cases is defeating its own object, and the magnificent work of all those A.R.P. workers and ambulance drivers who strive so much to bring patients to treatment at the earliest possible moment is being made of no avail by the delay that must occur in hospital with the present arrangements.—I am, etc.,

Liverpool, March 30. BRYAN WILLIAMS.

*** The distribution of air-raid casualties is discussed in an article by a special correspondent at page 526 and in a leading article at page 518.—ED., *B.M.J.*

Dyspepsia in the Army

SIR,—Most of the articles which have appeared in the *Journal* on chronic dyspepsia in the Army have been concerned primarily with the incidence of intrinsic organic lesions of the stomach and duodenum in men who have reported ill with "stomach trouble." Payne and Newman (*Journal*, 1940, **2**, 819) point out that during the period between the dispatch of the B.E.F. and April 29, 1940, 12.5% of all cases evacuated to the United Kingdom had a primary diagnosis of gastric or duodenal disease. The great majority of these men were shown on radiological investigation to be suffering from chronic duodenal ulcer. Morris (*Journal*, 1940, **1**, 1008) recorded the radiological findings in a series of 500 soldiers examined at a military hospital since September, 1939. In about 50% there was positive *x*-ray evidence of chronic gastric or duodenal ulcer. During the last year 256 soldiers have been referred to a general hospital on account of dyspeptic symptoms; these all had a barium meal *x*-ray examination, and the findings were as follows: gastric ulcer, 15 (5.8%); duodenal ulcer, 128

(50%); no ulcer discovered in the stomach or duodenum, 113. In other words, in this small series over half the cases were shown to be suffering from chronic peptic ulceration, and these figures run parallel with those recently published by Morris.

It may be stated, therefore, that if all the chronic dyspeptics in the Army who are referred to large general hospitals were examined radiologically it would be found that destructive lesions of the stomach and duodenum were present in fully half of the cases. Under existing circumstances, however, the true incidence of chronic ulcer of the stomach and duodenum will never be accurately assessed, because there are still a host of officers and men in the fighting Forces—a number of them holding key positions—who, although suffering from these conditions, prefer to treat themselves rather than report their condition to their medical officer. They know full well that if on *x*-ray examination a gastric or duodenal ulcer is discovered they will be invalided out of the Army without further ado. Those men, therefore, who wish to continue their services with the Forces (and I hold that the proportion of such men is high) find themselves with only two alternatives: either they must report themselves to the medical officer and risk discharge from the Army or they must refrain from reporting their condition and must take a chance on the subsequent development of complications.

It is claimed that as the majority of the men proved to be suffering from these lesions have already been dismissed from the Forces, chronic gastric and duodenal ulcers are no longer a problem in the Army. This, however, is incorrect. The incidence of chronic peptic ulcer among the adult population in Great Britain at the present time is about 12% to 15%, and there is no reason why this incidence should not be approximately the same among those serving in the Forces. If it is conceded that this estimate of the incidence is accurate, chronic ulcer of the stomach and duodenum will continue to be a very serious problem, which will, sooner or later, have to be faced and faced boldly.

I submit that those who are shown to be suffering from chronic peptic ulcer and who wish to be invalided out of the Services should be accorded this opportunity, as such subjects are unlikely to prove co-operative whatever line of treatment is adopted. But those similarly affected who, on the other hand, wish to continue to serve with the Forces should be given every facility for being treated in specially staffed and well-equipped hospitals set aside exclusively for the management of these cases. If carefully supervised medical therapy were applied thoroughly and efficiently in such specialized hospitals a large number of these soldiers could be rendered symptom-free and fit for further service; and the majority with chronic callous lesions or complications which demand operative treatment could, following such surgical measures, be placed in a graded position for a probationary period, and those proving to be satisfactorily cured be returned in due course to their units.—I am, etc.,

London, W.1, March 21. RODNEY MAINGOT, F.R.C.S.

Crush Injuries

SIR,—The articles on "Crush Injuries" in the *Journal* of March 22 are of intense medical interest, especially as further investigation of such accidents might result in combating successfully the syndrome referred to and therefore in saving lives.

A large proportion of the fatal accidents in mines result from crush injuries, many of them similar to those which are brought about by air raids. The experience and views of surgeons who deal with a large number of such cases in coal-mining areas would therefore be of immense value and greatly appreciated.—I am, etc.,

S. W. FISHER,
March 31. H.M. Medical Inspector of Mines.

SIR,—It may seem an impertinence for one with no experience of these injuries to write, but on reading the articles in the *Journal* of March 22 I felt that some ideas might justifiably be put forward.

During the time—a few hours or maybe days—that a person is buried under fallen masonry there is a continual loss of body fluid. There is the loss of intake fluid that the person would have taken during that period, and there is the loss that goes on ceaselessly during breathing. As this loss goes on the blood fluid must decrease and therefore the blood salts become more concentrated. The case becomes one of lowered blood volume and a resulting diminished renal blood flow. The *Journal* states, "Attempts made to explain the rising blood urea of hypochloraemia, gastro-intestinal bleeding, Addison's disease, diabetic acidosis have usually invoked the idea of lowered blood volume and diminished renal blood flow." Again, it states that "these cases resemble the toxaemia of severe burns"; but the ill effects of a burn are in direct proportion to the loss of fluid from the body due to the burn; so again the condition is due to the loss of body fluid.

In crush injuries we have not only a loss of fluid but also the effects of pressure. This pressure forces the blood from the part, and incidentally helps to prevent collapse by sending the blood to the brain, heart, and lungs. Where there has been a great loss of blood we bandage the limbs to force the blood to these parts. In crush injuries the weight does this.

To prevent caisson disease the chief treatment is slow decompression. Is it not permissible to take this as an analogy and copy it? When the weight is removed in a case of crush injury there must be a sudden expansion of the limb and a quick suction of blood into the part. This sudden suction must cause numerous slight extravasations of blood, and the sharp withdrawal of blood from the brain must lead to collapse. Would it not be better to have slow decompression in these cases? It would not be possible to withdraw the debris slowly, but it would be possible to bandage the part tightly as it becomes exposed. This bandage could then be slowly slackened over a period of time, and during this time fluids could be administered to make up for the fluid loss and to decrease the concentration of the blood.

The *Journal* also stated that "the pathological appearance of the kidney is said to have borne a resemblance to the transfusion kidney." Is it not possible that it *is* a transfusion kidney? In severe bleeding there is a loss of all the constituents of the blood, while in these cases there has been a loss not of all the constituents but only of the fluid part. This may have an effect on the blood transfusion.—I am, etc.,

Stewarton, Ayrshire, March 26. E. R. LLOYD.

SIR,—I have read with interest the accounts of renal failure supervening on crush injuries given in the *Journal* of March 22.

I think possibly toxic substances or toxins from the crushed muscles are absorbed into the blood and act on the kidney tubules as poisons. First the renal system is thrown out of gear, then secondary effects are observed in the blood and on other systems (e.g., lungs and heart). I think plenty of glucose would neutralize these toxins. I had once a very bad case of burns to treat—a child under 2 years with a large area of body surface burnt. Supposing that toxins must be absorbed from this large surface, I gave her as much glucose fluid as she would take—indeed, pushed it. (The burn was dressed with silver nitrate and tannic acid.) The child got jaundice and later nephritis, but was still given as much glucose as possible and recovered.

I do think that glucose somehow or other neutralizes toxins which may for the time being prove too much for the kidneys. Anyway, I think it is worth trying—both in drinks and in light diet; it should be pushed in as large quantities as the patient can be persuaded to take.—I am, etc.,

Liverpool, March 27. FLORENCE M. E. DAVIES.

Cerebral Venous Thrombosis after Childbirth

SIR,—The speculation conveyed in Dr. J. Shafar's letter (March 22, p. 455) has been in my mind also since I read the annotation on Batson's work (*Ann. Surg.*, 1940, **112**, 138) in the *Journal* of February 22 (p. 284). The paper by Dr. Sheehan and myself (March 8, p. 349) had been submitted for publication some time before the annotation appeared, and we were not aware of Batson's article, but in connexion with certain cases of thrombosis in the superior longitudinal sinus following childbirth, which I hope to report soon, the question had been persistently in my mind whether the thrombus in the sinus could not be in some way metastatic. When I read of Batson's findings I realized that it could. It is most tempting

to suppose that a minute fragment of clot, carried up through the vertebral system of veins, might lodge in an irregularity of the wall of the sagittal sinus and form the nucleus of a new clot, but I do not know yet whether the pathologists will support this theory; in Case II of our paper no such nucleus was found in what appeared to be the primary clot. If the fragment found its way into a superior cerebral vein it might conceivably act as an embolus, but it seems more likely that a secondary clot would have to be deposited on it before blockage occurred; that, however, is a minor point. I may say that one of my cases of sinus thrombosis lends further support to the theory of metastasis via the retrothecal veins, because the patient developed a spinal lesion as well; but, on the other hand, it must be admitted that the rarity of spinal lesions provides an argument against the theory.—I am, etc.,

London, W.1, March 27. J. PURDON MARTIN.

The New Price of Insulin Preparations

SIR,—You were good enough to publish recently a plea for the use of the stronger solutions of insulin (40 and 80 units/c.cm.) instead of 20 units on the ground of *national* economy—fewer bottles needed, less packing, less labour. Now the price of insulin has, I suppose inevitably, been raised to cover increased costs, and the argument of *personal* economy has been added. The following figures show that the retail increase is much greater in the weakest solution of insulin, and that the increased price can be largely offset by changing to more concentrated insulins.

Strength	Cost per 100 Units of Soluble Insulin Old Price	New Price
	s. d.	s. d.
20 units/c.cm.	1 0	1 5
40 units/c.cm.	11½	1 2
80 units/c.cm.	11	1 0½

It is clear that the increase in price can be largely avoided by using the stronger concentrations. The clinical effect is the same with all strengths, but may I emphasize the bulk of the injection must be *halved* or *quartered* to correspond to the stronger concentrations—otherwise hypoglycaemic disaster.—I am, etc.,

London, W.1, March 27. R. D. LAWRENCE.

Continuous Pentothal Anaesthesia

SIR,—Dr. Hastings Moore's description of the complications of pentothal anaesthesia (March 22, p. 462) suggests that his patients either do not receive premedication or receive preoperative atropine.

1. *Fibrillation of Muscles.*—Common with evipan and rare with pentothal, especially so after morphine.

2. *Sudden Muscular Contraction.*—Always due to too light anaesthesia and occurs less frequently with growing experience. The arm should always be so fixed as to prevent flexion of the elbow.

3. *Very Shallow Breathing.*—Should never be accompanied by cyanosis if the airway is clear. Continuous pentothal should not be employed by those inexperienced in its technique except in the presence of someone who is so experienced.

4. *Persistent Coughing.*—Commonest in patients who have not received premedication, and frequently initiated by an artificial airway. The orthodox view[1] is that further injection should be withheld, the cough and subsequent laryngeal spasm being due to a stimulant effect of the barbiturate on the parasympathetic nervous system.[2] It is exceedingly dangerous to increase the dosage as the respiratory centre is further depressed and the tendency to laryngeal spasm increased. Coughing will cease spontaneously, but may be cured by intravenous injection of 5 c.cm. of coramine or 2 c.cm. of cardiazol. Cyanosis with laryngeal spasm calls for most urgent remedying.

5. Doses of 2 grammes of pentothal are excessive. Prolonged post-operative sleep, with its attendant complications, led to the abandonment of the older barbiturates as anaesthetics.[3] Although pentothal is clinically innocuous, severe liver damage has been reported in experimental animals,[4] and Maclagan's results[5] suggested a mild degree after anaesthesia in human beings. In view of this it seems imprudent, except in emergency, greatly to exceed the dose of 1 gramme recommended by the makers. Pentothal can satisfactorily be followed or supplemented by nitrous oxide,[6] and the dose is reduced by at least one-third after morphine. It would be regrettable if one of the most valuable drugs available to us were to fall into disrepute as a result of its misuse. An artificial airway should not be necessary on leaving the theatre and, if used, should be lubricated with vaseline containing percaine or decicaine to dull the local reflexes.

Post-operative restlessness has not been found in some thousands of cases[7] where morphine had been used beforehand, and would be more likely to follow large than small doses.[8] A thrombosed vein, without symptoms, was found in my arm one week after intravenous pentothal. In view of this Dr. J. B. Wyman has undertaken a most painstaking research into its frequency and causation, preliminary reports from which suggest an incidence as high as 25%. The fundamental point is that continuous pentothal anaesthesia is entirely safe only in the absence of cyanosis. Anything else is of minor importance.—I am, etc.,

GEOFFREY ORGANE, M.D., D.A.

Westminster Hospital, S.W.1, March 24.

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Calcium Requirement

SIR,—Possibly you will be good enough to allow me to rectify a misunderstanding. "Children and pregnant women require other items of food as well as calcium which can only be supplied by milk. The latter cannot be replaced by bread calcium." They require first-class protein, for instance, and other items as well. Since milk must be given in any case to children and pregnant women for the sake of the many items of food they require, they are bound to get the necessary quota of calcium. Moreover, the work of Meulengracht (Meulengracht, E., and Meyer, A. R., *Acta med. scand.*, 1937, **92**, 584) suggests that where calcium deficiency is a factor the condition cannot be regarded as a single deficiency but a combination, and they had to treat those cases with vitamin D as well as with calcium. This suggests that bread calcium would not help this type of case.

You say there is no proof at all that "a large number of middle-aged people who exhibit evidence of kidney damage, etc., would suffer injury from this extra chalk." That a large number of middle-aged people do exhibit evidence of incapacity of normal renal concentration is a fact in support of which many of your readers will bear me out. Polyuria, and particularly nocturia, is a manifestation of defective renal concentration. If we include border-line cases who later develop more pronounced signs the number is very large indeed. I have been working for a good many years on this problem. It will be seen from our monograph *High Blood Pressure* that under certain conditions when the calcium intake is increased the work of the kidney due to calcium excretion may approach urea excretion values. It must be borne in mind that a slight increase in calcium intake may cause a considerable rise in the kidney work. But apart from kidney work it is an established fact referred to in our paper that calcium interferes with renal function. To increase the load on the kidney in such cases is as rational as to make a heart-failure case climb Snowdon. We must bear in mind that there will be the cumulative effects of calcium intake extending over a number of years. I say with the same certainty as that two and two make four that large numbers of middle-aged people would suffer injury if calcium were added to bread.

Finally, I would like to make the following point. The evidence, such as it is, which might justify the Government proposals is based on pre-war conditions. You do not accept this evidence, for you do not recommend the perpetuation of the "reform" after the war. I am not aware that there has

been an exhaustive inquiry with regard to the calcium problem under present conditions. Your leader, therefore, is merely an expression of opinion. This is not sufficient to justify such a drastic measure. Our paper was concerned solely with the scientific side of the problem. Clearly if you believed that the "reform" is scientifically sound you would not advocate its discontinuation after the war. I am glad that on the broad issue there is agreement between us.—I am, etc.,

Liverpool, March 22. I. HARRIS.

Calcium and Arteriosclerosis

SIR,—I have read Dr. Harris's letter on calcium and arteriosclerosis (March 22, p. 460) and also your editorial comment, and it appears to me that the politically supported therapy of communal dosage with calcium is just as "shot-gun" as Dr. Harris's communal deprivation of calcium. In both cases some people will benefit and others suffer, and the precise ratios of these are inevitably unobtainable. My own preference is towards the ideas of Dr. Harris, which are at least less expensive, less artificial, and more rational.

From the theoretical point of view, it seems to me that the quandary arises not so much from the "unprovability" of the ultimate analysis of the variations in the human blood as from the *static* concept of pathological processes which is still in the minds of many medical scientists. Thus, a man of 55 walks into the surgery and his condition is diagnosed as arteriosclerosis or other cardiovascular degeneration, and it is presumed that this condition is new or at least of a few years' duration. It is my belief that the seeds of arteriosclerosis, etc., are sown in the first five years of life in a soil that is present even before that early age. The *dynamic* concept of pathology postulates that "the child's diet is father to the man's arteries," and this should serve to direct the attention of calcium research workers towards the investigation of the blood of children and young people. The amassing of vast accumulations of research data, which must sooner or later reach the dustbin, seems to me regrettable when there are so many fruitful fields for research brains. The rationale of calcium therapy involves the important question of the reversibility of pathological cellular reactions and processes, and while I believe this reversibility is possible in early life, and in some cases of adult life, I think that such reversibility must disappear with age.

The lesson is clear: we cannot undo arteriosclerosis (just as we cannot surround every brick in an old slum dwelling with new mortar and cement), but we can prevent arteriosclerosis by diverting scientific, aesthetic, sociological, and political attention to those potential arteriosclerotics of to-morrow—the children of to-day. Until then, the human "slum dwellings" must be buttressed as patiently as possible. In general practice, the problem is patience, not patients, and in any case "the treatment of arteriosclerosis is a regimen, not a drug."—I am, etc.,

Kearsley, Lancs, March 22. D. OCKMAN.

Medical Planning Commission

SIR,—I have read with much interest the correspondence on the Medical Planning Commission which has been appearing in the *Journal* for several weeks. I feel that the B.M.A. is to be congratulated on having set up such a Commission and not waited for the Government to force its own plans on us, maintaining that we have no plans of our own. The medical services, including the general practitioner service, call for better organization; why not plan this ourselves?

For a time correspondents seemed almost entirely concerned with the constitution of the Commission—whether a sufficiency of general practitioners, of young men, of women had been selected to serve. While feeling that all these groups should be represented, the proportions seem to be of minor importance. Frankly, I consider the proportion of able men is greater in the ranks of the consultants than in those of the general practitioner, while conceding that the most brilliant man or woman may be found in the latter. But what we need is people of the reforming spirit, with knowledge and reasonable respect for the past. The reforming spirit may burn more fiercely in the elderly than in the young, and I have found junior colleagues with over-much respect for past traditions.

But lately a change has come over the correspondence, and writers, eschewing criticism of the composition of the Commission, are coming forward with suggestions for the Commission to consider—surely a more fruitful course to take. No better suggestion has appeared than that put forward under the title "Give Us the Tools," by Dr. Montuschi (March 22, p. 458). There should be no difference of opinion about the necessity for providing the general practitioner with proper tools, the means of investigating his patients thoroughly—means possessed at present only by the hospital staffs, without which he cannot—*pace* Dr. Montuschi—even diagnose anaemia. But Lord Dawson of Penn, in his Cavendish Lecture in 1919, put forward a scheme providing everything Dr. Montuschi wants, yet little in the intervening years has been done to put this scheme into operation, and I conclude from the absence of any support from him, when I have on various occasions attempted to awaken interest in the scheme, that even its author has lost heart. Is not this because we have been over-much engaged in consideration of remuneration to the disadvantage of service?

I am convinced the reorganization of the medical services on the lines advocated by Lord Dawson would be a great advance from the conditions now prevailing, and would restore to us the public respect, which I fear we have been losing.—I am, etc.,

London, W.8, March 25. HAROLD H. SANGUINETTI.

SIR,—Much has been written since the details of the Medical Planning Commission came out, the objects of which are to study wartime developments in relation to the medical services of the country. The sum and substance of all this correspondence is that there is widespread dissatisfaction with the representatives elected to serve on this Commission. To boil down the facts to a minimum: What is the question that is troubling every medical man—whether in the Services or not—to-day? Is it not, Are we or are we not going to have a State Medical Service after this war is over? If we are going to have a State Medical Service, then there are two sides from which we must view the question: (1) the outlook and views of the medical profession on the subject; (2) the equally important observations of the general public.

If we consider the first of these, let us here and now admit that the B.M.A. does not represent the whole of the medical profession. Much as that is to be deplored it is nevertheless the truth. Therefore, if the B.M.A. desires the thorough backing of the medical profession it would be well if it were to try to find out the views of every member of the profession, whether in the B.M.A. or outside it. Surely it would be worth sending out to each medical man a simple questionary, sounding his views on this most vital problem.

Second, and probably even more important, would it not be a good plan to try to find out just what the patients might think of it all? After all, they would probably be even more affected than we would by the change. A simple, plainly worded circular stating the changes that would take place and how they would affect the patient and his relations with his doctor could quite easily be devised. Each medical man could be supplied with a quantity of these circulars enclosed in stamped addressed envelopes. These could be distributed to his patients as they attend at the surgery, and their co-operation in answering them could be solicited. From both sides this would yield valuable information, and would be a good foundation on which to build up future plans. Then there could not be any grumbling that every effort had not been made to try to get the real opinion of all concerned in the matter.

In general it will be admitted that the younger generation lean towards a State Medical Service, while the older practitioner is much more sceptical of this change. I agree with Dr. Illingworth in his letter (March 8, p. 381) that hospitals could be run on a much better system. It is ridiculous that some hospitals should always be crying out for funds while others have plenty and to spare. It is the average man in the street, who gives least towards the hospitals, who requires their services most, so why should they not be financed and run by State funds? Better pay, too, for house-surgeons and members of the nursing profession is indicated. Just because the volun-

tary hospitals think that a doctor is only gaining experience they put him off with a trivial salary, regardless of the fact that he has still the responsibility to shoulder. Again, after this war is over the voluntary hospitals will not be able to depend on big individual donations, as there simply won't be the money about. I think, too, that hospitals should have full-time surgeons attached to them, who would be paid an adequate salary for the work they do in the hospitals and who would not be dependent for what they earn on their private outside work.

When it comes, however, to roping in the average general practitioner as a State servant I am not so sure that this move would be for the good either of the profession or of the public. For the profession it would make the science of medicine very much in the nature of a job to be done regardless of any personal feelings, and individual initiative would be very liable to suffer. For the public it certainly would disturb that essential personal element which is so bound up in the work of a general practitioner. No doctor who has been in general practice for any length of time will deny that the best practitioner is often not so much the one who knows all about the most obscure diseases as the one who has the personality to get the confidence and trust of his patients. I am sure it is on this point that the general public will have much to say.

I do not say that the panel system is a good one or that an extension of it is much to be desired. It is the best of a bad system, and actually in the more rural districts and smaller towns it works quite well, where the doctor has the time to treat his panel patients just as he does his private ones. It is in the large industrial centres that the panel system falls down, and patients are treated not so much as human beings but as so many nonentities who have to be pushed out of the surgery in double-quick time, simply because the doctor has not the time to devote to the work. Was this system accepted *en bloc* by the medical profession as a united body? The answer is very much in the negative, and yet here we have been, for the past thirty years, labouring along enduring a system which was none of our making. And is not this going to happen again unless the profession gets together and the consensus of opinion is found? If a State Medical Service is imposed and it does not work out as its advocates thought it would, what good will it be twenty years hereafter to say that it was not of our making?

I think this is an excellent opportunity for the B.M.A. to gain the support of the whole of the profession by finding out the opinions of each individual member and using this as a basis for future developments rather than trusting to the conclusions which a Medical Planning Commission may come to. It certainly would be the more democratic way.—I am, etc.,

J. M. MUIR, M.B.

Thongsbridge, nr. Huddersfield, March 19.

SIR,—Dr. Alfred Cox (March 15, p. 419) makes the astounding statement that "young doctors, unless they are predestined medical politicians, are usually too busy making their careers to take much interest in medical affairs." This strikes me as a typical example of the official or "headquarters" mind. It would be a bad day for England if only those who were predestined politicians or belonged to the select company at Westminster were capable of legislating for the future, and it will be an equally bad day for the medical profession when its future is entrusted entirely to those who have held high position in various departments or found favour at headquarters. The younger doctors are interested, vitally interested, in medical affairs, but it does not follow that they are always able or free to voice their opinions at B.M.A. meetings.

As a member for many years and an office bearer, I am becoming more and more impressed by the number of worthy men with ideas who are outside the ranks of the B.M.A., who sooner or later will become an "official" opposition as mentioned by Dr. W. Lyle (p. 420). And they are outside not because they are uninterested in medical affairs, but because they have in the past come up against the official type of mind which sees little wisdom in youth and now considers that the members of the Medical Planning Commission should be chosen only according to past deeds and past experience. This Commission is to plan for the future, which will mainly concern the young doctors of to-day, and even if at present "they are doing something more urgent and more important" steps could be taken to present their written evidence to the Commission obtained from many quarters.

The seer foretold that the old men should dream dreams but it was the young men who should see visions. There seems a danger to-day that the old men, who admittedly have the experience of past things, think that this carries with it the ability to see visions for the future. This does not follow. It is surprising how, as we grow older, we lose touch with the thoughts and aspirations of the succeeding generation. I and many of my age are old enough to know something of the difficulties and pitfalls of general practice, but we are also young enough to remould our medical lives on an enlightened plan, and have time in which to carry the plan into action if allowed to do so. The gulf between youth and age is partly due to youth thinking all old folk are out of date, but this attitude has been largely brought about by age seeing all youth as rash, unschooled, and foolhardy, and shutting all but the hoary hairs out of their inner counsels.

If the findings of the Commission are to receive the welcome reception of the profession as a whole and young men in particular, it would be well to see that the gulf between age and youth among its personnel is closed, and that ample inclusion is made of those who have the ideas and the time and vigour to see them carried into effect.—I am, etc.,

London, S.W.17, March 23. E. GERARD HOUSDEN.

SIR,—Dr. Alfred Cox's letter in regard to the Medical Planning Commission (March 15, p. 419) contains the naïve statement that "young doctors . . . are engaged on something even more important and more urgent." Surely the great majority of all active members of the profession are today engaged in the whole-time pursuit of their task to help the community to a successful conclusion of this war. Perhaps Dr. Cox, with tongue in cheek, thinks that that is precisely the fitting circumstance in which to take the profession's name in vain. Will the young men be grateful to the Commission for its haste to arrange the future in their absence? How very satisfying it is for those of us too old to be engaged in "something more urgent" that we should occupy ourselves with the young men's business!—I am, etc.,

London, S.E.24, March 15. KENNETH MCFADYEAN.

Malignant Measles?

SIR,—In reply to the correspondence on Dr. Audrey Baker's possible case of malignant measles (March 8, p. 380), I would like to mention a similar case I saw in January, 1940.

A boy aged 3½ years was admitted to hospital on January 17. He had a copious nasal discharge, loose cough, slight photophobia, and a temperature of 99.6°. On January 20 he developed a typical measles rash, and inquiry at the hospital from which he had been transferred revealed that several cases of measles had developed in the ward he left on January 17. On January 21 a severe purpuric rash appeared in the napkin area. The purpuric spots were thickly distributed and by the evening they formed solid blue-black ecchymoses on the buttocks and thighs. Small discrete purpuric spots became generalized over the whole body and on the uvula and fauces. The child's condition deteriorated rapidly, he looked extremely toxic and pale, the pulse was impalpable, and the heart rate rose to 160. Finally signs of bronchopneumonia developed at the right base, and the child died at 11 a.m. on January 23.

The chief findings at the post-mortem examination were a terminal bronchopneumonia and signs of extreme toxaemia. There was no haemorrhage into the suprarenals, but there was a considerable area of haemorrhage in the tissues round the lower pole of the right kidney.

I diagnosed this case as malignant measles.—I am, etc.,

Hereford, March 27. M. E. WARD.

Public Health Service

SIR,—If one may judge by the extensive correspondence you have had on the Medical Planning Commission, there must be something far wrong with the present-day practice of medicine in this country. One writer suggests that we look back and see where we have taken the wrong turning. In my opinion we do not have very far to look; and I think I am confirmed in my view in reading the other day in the *Times Literary Supplement* a review of *Practical Public Health*

Problems, by Sir William Savage, a very distinguished worker in the field of hygiene whose writings must be read with respect. The reviewer states:

> "He speaks of himself as an 'old-timer bred in the old tradition' in spite of 'a prolonged schooling along more modern lines.' Not so long ago the duties of a Medical Officer of Health were confined to matters of preventive medicine and collective hygiene. In the course of the last two decades he has become 'enmeshed—*malgré lui-même*—in institutional provision for the treatment of his failures in preventive medicine. In consequence he tends more and more to take less and less interest in those specialized problems of environmental hygiene which occupied so much of the energies of his predecessors.' The field is thus left to the engineer and the sanitary inspector. Yet the problems raised are not purely engineering but have important health aspects which require the help of the scientifically trained medical expert. In his book Sir William Savage deals with this no-man's land between the functions of the M.O.H. and those of the sanitary inspector and engineer. The appearance and development of such a no-man's land show that unification, no less than co-ordination, has its dangers. Between personal medicine and collective preventive sanitation there is a fairly clear line of demarcation. That the two branches of hygiene should be brought and kept in touch with one another is in the highest degree desirable. Yet there seems to be good practical reason for basic departmentalism."

I think this warning is very much needed at the present time. If we glance at the history of the evolution of the present-day M.O.H. we find that he was originally an expert in sanitation and epidemiology, held in high respect by his colleagues in other branches of medicine. His successors have become regular Pooh-bahs: school medical officers (with no special training—six months house appointment is adequate for officering a post as an assistant school medical officer); chief tuberculosis medical officers (with no training in tuberculosis, but that ignorance covered up by the appointment of a "clinical tuberculosis officer"); chief venereal disease officer (again with a "clinical V.D. officer"); chief of maternity and child welfare clinics (divorced from the actual practice of obstetrics); directors of our hospitals (general, mental, and all the rest); and, last, administrators of our emergency war hospitals. His present state can be summed up as a jack-of-all-trades and master of none.

Now, Sir, are we to hand over the administration of all our professional activities to such an officer? If so, many of us will not regret our retirement. I would suggest that the M.O.H. is not a fit and proper person to be raised to this eminence in the profession. He has neither the training nor the experience nor the necessary professional status. In fact, I question if any medical man has all the necessary qualifications, and I would suggest that the M.O.H. be relegated to his proper sphere as a specialist in collective hygiene, and that his advisory functions to local authorities be handed over to a professional body embracing all branches of the profession practising in the district (medical, surgical, obstetrical, and laboratory). We have the germ of the idea in our Local Medical and Panel Committees.

In overhauling the M.O.H.'s department, attention is required to the various clinics that have grown up with him. Instead of our tuberculosis dispensaries, school, child welfare, and maternity clinics staffed by cheap "specialists," let us have real specialists of consultant status. What practitioner in his senses would send a patient to any of these clinics—with a few notable exceptions—say, when a university-allied hospital was available?

This is too big a question to consider in a letter such as this, but I might add that I have been informed that the abolition of the M.O.H. in his present state has been mooted in higher administrative circles, and also that the redistribution of our administrative areas is considered to be long overdue—that the present artificial county boundaries should be replaced by a regrouping around their natural centres, the cities and towns. Something of this sort is essential before we can get very far with any medical planning.—I am, etc.,

Galashiels, March 18. KENNETH MCLAY, M.D., D.P.H.

Village Settlements for the Tuberculous

SIR,—Dr. T. Francis Jarman writes (March 1, p. 335): "That a nation-wide need exists for workshops and factories where workers with arrested tuberculous lesions can be employed under special conditions and under medical care, no one working in anti-tuberculosis schemes can deny." This I ascertained to be true several years ago from the replies I received from many tuberculosis medical officers and superintendents of sanatoria to a questionary which was published in a report I was asked to make for the former Labour Party Advisory Committee (Public Health).

During the period I was tuberculosis medical officer I was mainly responsible for the foundation and administration of the late Efford Tuberculosis Colony (Plymouth) for ex-Service civilians and pensioners, and experience there taught me that the Government was *not* prepared "deliberately to foster and encourage the initiation of schemes of this kind." There is little reason to believe that the Government will do so *now*. On the contrary, this "colony," under the patronage of Prince George and members of the public health committee (Plymouth), though well situated and housed, received no financial support from the Ministry of Health or borough council, and it had to close down after a struggle for existence for ten or twelve years. It was conducted on the lines of the Papworth Village Settlement, with which and with whose founder I was personally acquainted, and to which I sent many patients. I attribute this failure mainly to the "restrictive influences of the profit system on medical economics" and partly to a belief that it was an "experimental" scheme.

At that time I visited the medical institutions of the U.S.S.R., and I found on inquiry that only "night sanatoria" for the tuberculous were included in their after-care schemes of "labour prophylactoria," and it is good news to hear from Dr. Jarman that the principles and practice of the late Sir Pendrill Varrier-Jones are now included in these schemes within the organization of the medical service of the U.S.S.R. In any case we should all work for a new world order, incomparably superior to the Nazi one, which would include such settlements within a complete, unified, efficient, and non-bureaucratic medical service on a national basis. I may say that the same fate as that of "Efford Colony" befell the "Laira Hostel (Plymouth) for Children" (who were "home contacts" with cases of active tuberculosis) after five years' struggle on a voluntary basis.—I am, etc.,

F. G. BUSHNELL, M.D., D.P.H.,
Vice-President and Life Governor, Devon and Cornwall Sanatorium.

Nurse Anaesthetists

SIR,—It is to be hoped that Mr. Loughnane's experience (March 22, p. 463) regarding anaesthetists' attendance at hospital is unusual; so far as my experience of teaching hospitals is concerned it is not only unusual but unique. If, however, his unhappy lot is a common one among operating surgeons, surely the proper remedy is not nurse anaesthetists but more competent qualified anaesthetists and better arrangements to regulate their attendance.—I am, etc.,

London, W.1, March 24. J. BLOMFIELD.

The March issue of *Industrial Welfare and Personnel Management*, the journal of the Industrial Welfare Society, contains an article on "The Rhythm of Work and Rest" by Dr. W. M. Burbury, who writes: "A great deal has been done recently in providing recreation during the working period, concerts at the lunch break, or music in the workroom. These things are very good in themselves, but they are not necessarily good for all workers. It depends on the type of person. Even in these recreative outlets there must be variety in order to avoid monotony: radio for half an hour, freedom to talk for another half-hour, and different kinds of relaxation from day to day." Dr. Burbury discusses the disturbances in the rhythm of our lives brought about by the war. Another article, on "Industrial Catering in Bombed Areas," records the experiences of a Coventry works canteen. Dr. John P. Steel, medical superintendent of the Smithdown Road Hospital, Liverpool, gives a very favourable account of the use of pure cod-liver oil (which is rich in vitamin A and D content) for the dressing of burns and wounds. He insists that only a medicinal oil should be used, and it should be pure, sweet, and fresh, just as it exists in the liver of the live fish: the word "crude" has led to misunderstanding and disfavour.

Obituary

SIR WILLIAM SMYLY, M.D., F.R.C.P.I., F.R.C.S.I., HON. F.R.C.O.G.

Sir William Smyly was born at 13, Merrion Square, Dublin, on November 14, 1850. He was the third son of Josiah Smyly, M.D., and Ellen his wife, who was the founder of Smyly's Homes and Schools for necessitous children. His elder brother, Sir Philip Smyly, was a celebrated surgeon, who was Surgeon-in-Ordinary to the Queen in Ireland. Smyly married Eleanor Colpoise, younger daughter of Henry Tweedy, M.D., thus increasing his connexion with the medical profession. They had two sons and four daughters: one son died in early life; the other, after a distinguished career at Trinity College, went to China, where he is engaged in medical missionary work. Of the daughters, one married her cousin, Sir Philip Crampton Smyly, late Chief Justice of the Gold Coast: the second married Dr. Hobhouse of London; the others remained unmarried, and were devoted to their father.

Smyly was educated at home and at Trinity College. Later on he studied in the clinics of Vienna and other cities on the Continent. After qualification he decided to specialize in obstetrics and gynaecology, and became assistant master at the Rotunda Hospital. In November, 1889, he became Master of the Rotunda, at a time when the fortunes of the hospital were at rather a low ebb: but soon the tide turned. From the first he showed indomitable energy: there was neither excitement nor fuss about this energy; "the dear little man," as some of his patients called him, pursued his object until it was accomplished. Gynaecological surgery was in its infancy, and he immediately took steps to ensure that the promising infant should be looked after. His first act as Master was to collect funds to build a wing for gynaecological patients. As the result of much enthusiasm on his part and that of his wife in raising money, and through the generosity of friends, the "Cairnes" gynaecological wing was completed, and soon aseptic gynaecological surgery was in full swing at the Rotunda. The theatre was small and, according to modern standards, poorly equipped. It was the first theatre in any obstetrical hospital and was far in advance of its time: an original device in its design was a glass screen separating the onlookers from the operating table. Much excellent work was done here when mortality was high elsewhere.

Smyly was an inspiring teacher, and postgraduates from all parts of the world flocked to the hospital. Needless to say, obstetrics was retained as the prime study. I have been able to trace the reports of the Rotunda for four years of his Mastership: his results were good, in spite of the fact that there were ten cases of sepsis in his first year: he overcame this outbreak so well that he had no mortality from this cause in the subsequent two years. His chief method of dealing with the epidemic was the prevention of vaginal examinations. I believe he was the first to show the value of morphine in eclampsia. "No meddlesome midwifery" was his watchword; and it is interesting to realize that in the diminutive labour ward, with its concrete floor, the results were at least as good as those obtained in the modern labour wards; and it must be remembered there were no gloves, no masks, no shaving, but there was great supervision: and cleanliness and natural labour were the key words. He introduced trained maternity nurses instead of untrained midwives into Ireland. There had been no night nurses, and the midwives used to sleep at night, sometimes in bed with the patients. He used to say: "If you give me a good nurse, I can train her into a good midwife, but I cannot train a midwife into a good nurse." Among other interesting innovations was the introduction of vegetables into the diet of the nursing mother.

When Smyly had completed his period at the Rotunda he became gynaecologist at the Adelaide Hospital, where he was highly successful both as an operator and as a teacher. Personally he was a beloved physician, and had an extensive private practice. He was a first-rate raconteur, and it was a delight to sit next to him at a dinner. His family life was ideal: he was devoutly religious, and served on the committees of many charities devoted to religious objects. He represented the Dublin Diocese of the General Synod of the Church of Ireland, and was associated with numerous nursing societies, Boys' Brigade, etc. The Masonic Order has lost in him a valuable Brother. For many years he was the Senior Grand Warden in the Grand Lodge of Ireland. In his youth he was a violinist and played a good deal of chamber music.

He contributed largely to obstetrical and gynaecological literature, and attended the Royal Academy of Medicine until comparatively recently. He had many honours conferred on him. He received his Knighthood in 1905. He was a past President of the Royal College of Physicians in Ireland; of the obstetrical section of the Royal Society of Medicine; of the Royal Academy of Medicine in Ireland; and of the British Medical Association. He received the Honorary Fellowship of many colleges and learned societies, including the Royal College of Obstetricians and Gynaecologists, the Royal Academy of Medicine in Ireland, the Edinburgh and Leipzig Obstetrical Societies.

Although he had attained the great age of 90, we saw him until quite recently at the reunions at the Rotunda and at the Royal College of Physicians, where he was still his cheery smiling self. Sir William Smyly was an example to the young and to the old; a pleasant companion; an honest and knowledgeable physician always more than alive to the necessity for the observation of strict ethics. He lived his span and lived it well. We extend our sympathy to his family, who, like ourselves, will surely miss him.

B. S.

W. D. DONNAN, M.D.

We regret to announce the death on March 17 of Dr. William Dunlop Donnan of Holywood in his seventy-second year. The son of William Donnan of Holywood, Co. Down, he was born in Colombo while his parents were in Ceylon. He was one of a distinguished family, and his younger brother, Prof. F. G. Donnan, was the pupil and successor of Sir William Ramsay at University College, London. Dr. Donnan was educated at Queen's College, Belfast, and graduated in the Royal University of Ireland in 1893. In 1898 he was awarded the much-coveted gold medal of the Royal University when he obtained his M.D. He was a lifelong member of the British Medical Association and a Fellow and past-president of the Ulster Medical Society.

Donnan began practice in Holywood more than fifty years ago. There he became medical officer of Castlereagh No. 2 Dispensary, A.R.P. medical officer for Holywood, and police surgeon. The writer of this memoir has many happy recollections of his residence in the old Royal Victoria Hospital at the time when Dr. Donnan was house-physician and house-surgeon. He owes much to his friendship and to his early instruction in clinical medicine. During Donnan's first years in practice he was an ardent laboratory worker, and from Lorrain Smith's laboratory he and the late Dr. James Colville published in the *British Medical Journal* in 1898 the first paper from Ulster on the Widal reaction. He maintained his interest in this type of work, as some of his more recent publications and papers show. By all who knew him Donnan was rightly regarded as a man of outstanding ability and great promise, and it was with some misgivings that his friends learned of his decision to do his life work as a country practitioner in his native town of Holywood. When, however, his fifty years of active practice are rightly assessed there can be no regret at this decision. He brought to bear on his extensive practice untiring energy, great judgment, and a thorough knowledge of medicine; all his work was good work well done, and there are many in the Holywood district who have reason to regret his death and revere his memory. He leaves a widow and two sons, who are both in practice in Holywood; to them we offer our sincere sympathy.

The Services

Colonel S. W. Kyle, retired, late R.A.M.C., has been appointed a Deputy Director of Medical Services, and has been granted the acting rank of Major-General.

ARMY AWARD

The D.S.O. has been awarded to Lieut. James Morton Muir, R.A.M.C., in recognition of gallant and distinguished services in the field. The published announcement of the award said: "During the battle of Sidi Barrani in December he was severely wounded in the shoulder and pelvis by splinters of a shell which hit the regimental aid post vehicle. He insisted on being propped up beside his vehicle, refusing an injection of morphine so that his senses might remain clear. Though suffering intense pain he continued for approximately eight hours to give directions on the care of the wounded as they were brought in until loss of blood made it impossible for him to remain sitting. He was laid down, but continued to give directions and advice until the last wounded man had been evacuated, and only then did he consent to be placed in the ambulance. His devotion to duty undoubtedly saved many lives and was a tremendous inspiration to the personnel of the post and to the wounded men."

CASUALTIES IN THE MEDICAL SERVICES

Royal Navy

Surgeon Lieut. JOHN FFRANGCON ROBERTS, R.N.V.R., the elder son of Dr. and Mrs. Ffrangcon Roberts of Histon, Cambs, is reported missing, believed killed, in the Middle East last month. He was 25 years of age, and received his medical education at the London Hospital, qualifying M.R.C.S., L.R.C.P. in 1939. He had held the posts of resident anaesthetist and receiving-room officer at the London Hospital and resident medical officer at an E.M.S. hospital.

Probationary Temporary Surgeon Lieut. WILLIAM GRAHAM CUTHBERTSON, R.N.V.R., is included as "Killed" in an Admiralty casualty list published on March 24. He was 24 years of age, and was educated at Annan Academy, Stewart's College, Edinburgh, and the University of Edinburgh, where he graduated M.B., Ch.B. in 1939. He held a house post at St. Luke's Hospital, Bradford, before joining the R.N.V.R. in April, 1940. He saw service along the Libyan coast and was present at the action at Taranto.

Royal Army Medical Corps

Lieut. DONALD ALFRED BIRD was killed in France on June 18, 1940. He was born in Canada in 1914, took the Scottish triple qualification in 1939, and joined the British Medical Association in the following year.

Wounded

Captain Victor James Keating.
Lieut. Alexander Wilson Forbes Catto.

DEATHS IN THE SERVICES

Surgeon Captain EDWARD JOHN MORLEY, R.N. (ret.), died at Bournemouth on March 13. He received his medical education at Guy's Hospital, and took the L.R.C.P. in 1878, the M.R.C.S. in 1879, and the F.R.C.S. in 1891. Entering the Royal Navy soon after qualifying, he attained the rank of fleet surgeon in 1899 and of surgeon captain in 1910. He served in the war of 1914–18, receiving the medals.

Colonel THOMAS HENRY MATTHEWS CLARKE, C.M.G., C.B.E., D.S.O., late R.A.M.C., died at Rathfarnham, Co. Dublin, on March 4, aged 71. He was born on June 15, 1869, at Nassau, in the Bahamas, the only son of Staff Surgeon T. M. Clarke, A.M.D., who died there soon afterwards. He was educated at Trinity College, Dublin, where he graduated M.B., B.Ch., B.A.O. in 1895. Entering the Army as surgeon lieutenant in 1897, he became lieutenant-colonel in 1915, colonel in 1918, and retired in 1920. He served in the action at Kandia, Crete, on September 6, 1898, when he was wounded, and was mentioned in dispatches in 1899, receiving the D.S.O. From 1900 to 1903 he was Personal Physician to Prince George of Greece. He was seconded for special service under the High Commissioner for Crete from 1901 to 1903, and for his services received the C.M.G. in 1903 and was appointed a Knight of the Order of the Saviour of Greece. In 1912 he became physician and surgeon to the Royal Hospital at Kilmainham, a post which he held until the war of 1914–18. During that war he served in France and Flanders, was mentioned in dispatches, and received the C.B.E. He was the author of an article on sanitary work in Crete, and contributed a paper on prehistoric sanitation in Crete to the *British Medical Journal* in 1903. He had been a member of the British Medical Association for forty years.

Lieut.-Colonel HENRY WARWICK ILLIUS, C.I.E., I.M.S. (ret.), died at Funchal, Madeira, on February 13, aged 65. He was born at Bahia, Brazil, on October 9, 1875, received his medical education at St. Bartholomew's Hospital, and took the M.R.C.S., L.R.C.P. in 1900 and the F.R.C.S.Ed. in 1906. Entering the I.M.S. as lieutenant in 1901, he became lieutenant-colonel in 1920, and retired in 1930. Most of his service was passed in civil employ in the United Provinces, where he was on plague duty from 1907 to 1909, when he obtained a civil surgeoncy and held civil appointments until his retirement, except that from 1914 to 1921 he was on military duty. He served on the North-West Frontier of India in the Waziristan Campaign of 1901–2 (medal with clasp); in the Tibet War of 1903–4 (medal with clasp); and in the war of 1914–18, in Iraq in 1920–1, when he was twice mentioned in dispatches and received the C.I.E. He was a brother of Lieut.-Colonel J. W. Illius, I.M.S. (ret.). He had been a member of the British Medical Association for thirty-seven years.

Lieut.-Colonel HAROLD EDGAR PRIESTLEY, C.M.G., R.A.M.C. (ret.), died at Yateley, Hants, on March 16, aged 62. He was born on January 24, 1879, received his medical education at St. George's Hospital, and took the M.R.C.S., L.R.C.P. in 1905. Entering the R.A.M.C. as lieutenant in 1905, he became major in 1915, lieutenant-colonel in 1930, was placed on half-pay on account of ill-health in 1932, and on the retired list later the same year. He served in the war of 1914–18, was mentioned in dispatches in 1918, and received the C.M.G. for his services in the typhus epidemic at Wittenberg during that war, when some 15,000 British prisoners of war were confined in a camp of some ten and a half acres at Wittenberg and were insufficiently clothed and half-starved. Typhus broke out in the camp, the German medical staff refused to attend the patients, and all communication with the camp was cut off, food being sent in by trolley and orders shouted from outside. Six R.A.M.C. officers volunteered to attend the men, and three of the six died of typhus. Major Priestley survived, but his health was permanently affected, though he put in a further fifteen years' service. Among appointments which he held later were those of medical officer of the Duke of York's Military School at Dover and medical officer of the Royal Military Academy at Woolwich.

Universities and Colleges

UNIVERSITY OF BIRMINGHAM

Lectures in Industrial Medicine

A course of six lectures in industrial medicine for medical officers appointed to factories will be held in the Medical School on Saturday and Sunday, April 19 and 20. The course will be open also to all members of the medical profession interested in the subject. Further particulars may be obtained on application to the Dean of the Faculty of Medicine, the Medical School, Birmingham, 15.

UNIVERSITY OF LIVERPOOL

The following candidates have been approved at the examinations indicated:

FINAL M.B., CH.B.—*Part I:* [1]D. Annis, A. Ansell, E. R. Banner, [1]Beryl R. Bentley, [1]Margaret J. Blackburn, K. W. Boggis, H. O. M. Bryant, E. Burman, [1]E. F. B. Cadman, [2]Eva V. Cooper, K. H. Dalrymple, A. S. Davidson G. Davies, [1]J. N. Dearnaley, J. F. Doherty, K. E. Donnellan, Ann Donnelly, I. H. Foy, H. Francis, H. G. Frank, [1]H. Friend, [1]S. M. Green F. D. Griffiths, Elizabeth M. Harper, A. Jolleys, Eirwen M. Jones, [1]S. E. Keidan, [1]H. Lewis, I. P. Madhok, Margaret L. Magee, A. W. Merrick, A. F. Murphy, [1]R. C. Nairn, K. H. Oldfield, C. Pownall, N. E. Raybould, R. L. B. Roberts, A. J. Robertson, P. L. Robinson, M. J. R. Ryan, Betty Schofield, E. Scott, E. R. Shepherd, K. H. Slatter, H. O. Williams, [1]Margaret Woolfenden. *Passed in Individual Subject:* Mary A. R. Allan (Pharmacology and General Therapeutics). *Part II:* E. H. Annels, A. S. Beadel, J. J. Bligh, [3]S. Bradshaw, Hilda E. Bullen, E. R. Carter, W. P. Clothier, V. L. Cooper, H. V. Cross, J. G. K. Dean, P. J. Devlin, Jean M. Frazer, K. C. Fulton, Patricia F. M. B. Gould, Joan O. Grant [1]T. C. Highton, M. Horwich, R. D. Hotston, H. P. Hughes, F. A. H. Inman, W. B. E. Jones, J. J. Lieben, J. Littler, M. L. P. Lyons, Jane C. S. Maclachlan, [3]L. Mandel, A. J. Marsden, R. H. Martin, R. H. Maudsley, Betty W. Morris, P. D. Moss, J. C. B. Murphy, S. P. C. O'Reagain, C. Pownall, G. J. Rees, Hilda M. Reeve, G. C. Roberts, C. D. Rosenwald, D. I. Rowlands, J. M. G. Sarson, T. L. Schofield, Irene W. Simpson, R. V. Tracy Forster, Amabel M.

Turner, D. C. Watson, R. H. Watts, G. A. Wetherell, D. W. Wilson, [2]H. S. L. Young, [2]Rosalind Zalin.

DIPLOMA IN TROPICAL MEDICINE.—P. Austin, P. R. Cooper, U. K. Menon, L. Merrill, G. Prasad, W. B. Young.

[1] Distinction in pharmacology and general therapeutics. [2] Distinction in pathology and bacteriology. [3] Distinction in public health. [4] Distinction in forensic medicine and toxicology.

UNIVERSITY OF SHEFFIELD

The following candidates have been approved at the examinations indicated:

M.D.—M. B. Brody.

FINAL M.B., CH.B.—*Parts II and III:* *E. H. Jones, *M. Laird, C. H. Foggitt, P. S. D Gowers, J. D. Hopewell, J. R. Horn, N. R. Marshman, Joan Pattison, F. Rudnicki, C. H. B. Sparrow, P. Turner.

* With second-class honours.

UNIVERSITY OF EDINBURGH

At the meeting of the University Court on March 24, with the Principal, Sir Thomas Holland, in the chair, regulations for the Whaitt Research Scholarship Fund were adopted on the recommendation of the Senatus. The free income of the fund is to be used to provide one or more research scholarships in some branch of medicine to be chosen from time to time by the University Court on the recommendation of the Faculty of Medicine and the Senatus. The subject, conditions of award, amount and duration of each scholarship will be advertised beforehand. Graduates in any faculty of the University or of other approved universities, or licentiates of approved colleges, will be eligible for the award of a scholarship.

UNIVERSITY OF DUBLIN

SCHOOL OF PHYSIC, TRINITY COLLEGE

The following candidates have been approved at the examinations indicated:

M.D.—G. J. Dixon, R. T. Jackson, P. A. McNally.

FINAL MEDICAL EXAMINATION.—*Medicine, M.B.:* [2]B. W. Wyllie, [2]E. D. Kerr, [2]Alicia G. Pike, M. E. Weiner, W. G. D. Caldwell, A. F. Crowley, H. H. Robinson, J. R. Healy, H. B. C. Houston, W. F. Thompson, I. Shribman. *Surgery, B.Ch.:* M. A. Majekodunmi, J. L. Handelman, Kathleen M. Patterson, N. H. Stewart, A. H. H. Guilbride, L. C. Jacobson, S. Smullen, A. F. Crowley, C. D. MacCarthy. *Midwifery, B.A.O.:* [1]G. B. Gibson, [1]Elizabeth D. L. Simpson, [2]S. T. McCollum, [2]G. S. Prince, [2]Maude F. P. Bigger, [2]Emmeline P. Crowe, [2]Kathleen M. J. Morphy, [2]P. C. Smyly, [2]Margaret F. Y. Dixon, [2]J. B. Dunlop, [2]J. R. Hassard, [2]M. J. M. Solomons, J. P. Hearne, J. P. Walsh, Helen S. Watson, T. A. H. Black, C. R. Griffin, Ivy K. Bayne, Ethna M. MacCarthy, L. H. Shrago, Gladys M. Byers, L. H. Citron, A. C. MacA. Hobson, G. F. Shaw, B. Kernoff, A. McC. Russell, R. O. D. Reid, J. N. Greene, T. L. Kelly, A. G. Lee, Dorthy H. Wester, C. E. Williams, A. C. McReynolds, T. J. N. Bates, H. Lesselbaum, C. W. Lloyd, A. R. B. Jackson, D. J. Naughton.

D.P.H.—*Part 1:* [1]W. Hayes, [2]F. W. Crook.

[1] With first-class honours. [2] With second-class honours.

Medical Notes in Parliament

Adjustment of Financial Liabilities due to War

Moving in the House of Lords, on March 25, the second reading of the Liabilities (Wartime Adjustment) Bill, Viscount SIMON said that owing to the shifting of population a large number of people who before the war carried on the professions in the ordinary way had been put into extreme financial difficulty. The Bill applied to "any person who is in serious financial difficulties owing to war circumstances." That person might be a professional man whose clients or whose patients had moved elsewhere. The Courts (Emergency Powers) Act would in proper cases prevent the imposition of damages or distress for rent, but under it the debtor saw piling up over his head a mountain of obligations. To make him go through the Bankruptcy Court was inappropriate. The Bill provided machinery for bringing together the debtor and his creditors for the purpose of seeing, with the help of a liabilities adjustment officer, whether an arrangement could be reached to the benefit of both debtor and creditors. If all agreed a scheme would become operative at once. If a majority agreed the adjustment officer could approve a scheme, but a minority creditor could secure a review of the matter by a county court judge. There would always be priority for one year's taxes and for debt in the nature of wages. In cases where the adjustment officer had not produced agreement the county court could be invited by the debtor or by any creditor to devise a liabilities adjustment arrangement. The home and furniture of a debtor and the tools of his trade would be exempted from the property to be realized. In exercising its powers the court would have regard to the prospects of the business.

The Bill was read a second time.

State Medical Service

Mr. LYONS asked on March 26 whether Mr. Ernest Brown would consider as an early post-war scheme of reconstruction the establishment of a complete State Medical Service, incorporating clinical, specialist, and scientific facilities in a nation-wide proposal of general application. Miss HORSBRUGH replied that the importance of the facilities to which Mr. Lyons referred would not be overlooked, but Mr. Brown was not in a position to make a statement at present as to the form in which such facilities could most suitably be provided.

Gas Warfare

Replying on March 27 to Mr. Simmonds, Mr. HERBERT MORRISON said this country would in no circumstances be the first to employ gas. The civilian gas mask, when properly used, gave full protection against any known war gas. The Government was taking fresh steps to ensure that every member of the population carried, practised with, and was in every respect familiar with his gas mask. Exercises and propaganda would be employed to this end. With proper measures of protection such as were now available to the population there was no ground for serious alarm about the effect of gas attack, provided always that proper precautions were taken and that the public obeyed the advice given to it. Mr. Morrison added that it was not considered necessary to make a general issue of eye-shields to the public at large.

Annual Report of Ministry of Health: Wartime Cessation

Asked by Mr. Rhys Davies on March 27 when the annual report of the Ministry of Health for 1939–40 would be published, Mr. ERNEST BROWN said he regretted that in view of the work involved, the pressure under which the staffs of the Ministry and of local authorities worked, the shortage of paper, and other difficulties, it would not be practicable to continue the publication of annual reports during the war. Following the practice adopted in the war of 1914–18, material was, so far as circumstances permitted, being collected for publication in a composite report after the end of the war. He would look into the possibility of giving a summary.

Registration of Alien Doctors

Sir HENRY MORRIS-JONES suggested on March 27 that the arrangements for allowing alien allied doctors in this country to help in the joint cause by becoming temporarily registered medical practitioners were slow and unsatisfactory. Mr. BROWN answered that the Central Medical War Committee, which acted as a clearing house for supplying alien doctors to hospitals and other authorities desiring to employ them, had received a large number of names from various sources. It would be glad to receive others from the Allied Governments concerned, with some of which it was already in touch. The procedure took some time to set in motion, including as it did the steps necessary for registration with the General Medical Council and for satisfying the general requirements relating to aliens. It was now working smoothly.

Replacement of Civilian Medical Practitioners by R.A.M.C.

On April 1 Captain MARGESSON, in reply to Miss Ward, who asked for an assurance that no action would be taken against civilians reporting on conditions in the Auxiliary Territorial Service through parliamentary channels, said he was assured that Miss Ward was referring to a misunderstanding which arose out of a long-standing decision to replace civilians by R.A.M.C. women doctors, where available, on the panels formed to examine A.T.S. recruits. Notice of the

termination of their appointments was sent simultaneously to all the civilian members concerned, and there was therefore no question of discrimination against an individual.

Replying to a further question by Miss Ward, Captain Margesson said that the decision to replace civilians by R.A.M.C. personnel was taken partly because the method of payment of civilian doctors was unsatisfactory and partly to economize in medical personnel.

Fatigue in Factory Workers.—Answering Mr. Rhys Davies, Mr. ERNEST BEVIN said on March 13 that factory employers were encouraged, as a part of their arrangements for proper supervision in the interests of health and efficiency, to keep records of sickness and absenteeism which might afford indications of excessive fatigue or of something else amiss in a factory or in a particular department of it. It would not usually be possible without close inquiry at the particular factory, which would primarily be a matter for the management, to ascertain how far any evident fatigue or ill-health or accidents were attributable to speed of working as distinct from long hours and other factors. The importance of optimum rates of work from the point of view both of efficiency and of accident prevention was stressed in the Industrial Health Research Board Report on Industrial Health in War, which received wide publicity, as well as in other publications.

Home Guard Casualties.—Mr. ERNEST BROWN stated on March 25 that the air-raid precautions services are to cater for casualties among the Home Guard as they do for civilian casualties. The decision is being made known by his Regional Officers to local authorities concerned. He added that there was no need to establish additional first-aid facilities to meet the needs of Home Guard units. Arrangements for augmenting, if necessary, the personnel attached to existing first-aid posts and for paying the necessary remuneration were being made known by Regional Officers to the local authorities.

Procedure for Recruitment of Doctors.—Mr. BROWN told Mr. Groves on March 25 that the procedure adopted by the Central Medical War Committee and the Local Medical War Committees in selecting doctors for recruitment to the Forces provided for a full investigation in each case of the needs of civilian practice. The local committee invited representations both from the doctor himself and from interested parties, such as his partners, or, if he was an assistant, his principal, a hospital or any public authority by which he was employed, and, if he was an insurance practitioner, the Insurance Committee. These recommendations were fully considered, and if so desired were made orally. If the local committee recommended recruitment, objecting parties might make representations to the central committee in the same way.

Shortage of Mental Hospital Nurses.—On March 27 Mr. Brown was asked by Mr. SORENSEN whether he was aware of an increasing serious shortage of male and female nurses in mental hospitals owing to their voluntary or compulsory transference to military or war work. Mr. BROWN said he knew that difficulties were in some cases being experienced in this as well as other services administered by local authorities. The matter was being kept under review in consultation with the Ministry of Labour and National Service. The Ministry of Health was in touch with the local authorities on it. In some districts this was a major problem.

Notes in Brief

Lord Woolton and Mr. Brown are consulting on the possibility of importing concentrated orange juice.

According to the latest information, 121 tuberculosis authorities out of 174 in England and Wales have made after-care arrangements. The number of new cases attending dispensaries is well maintained in urban areas, having regard to the effects of evacuation from those areas.

The weekly value of cash, clothing, food, and other allowances paid by the London County Council to their nursing staffs varies from £3 2s. 3d. for probationers in training, non-resident, to £5 1s. 5d. for sisters.

Arrangements for the rehabilitation of disabled ex-Service men under medical supervision are in operation by the Ministry of Health's Emergency Service and the Ministry of Pensions.

Arrangements for the fees payable for radiological examination and report on a Service out-patient to voluntary hospitals at which medical staffs are remunerated for Emergency Medical Service work on the occupied-bed basis are at present under revision.

In 1940 eight deaths were reported in the United States as directly due to the celebration of the Fourth of July with fireworks and other explosives. There were two cases of tetanus in 1940, of which both recovered, as compared with three in 1939 and two each in 1937 and 1938.

No. 10

INFECTIOUS DISEASES AND VITAL STATISTICS

We print below a summary of Infectious Diseases and Vital Statistics in the British Isles during the week ended March 8, 1941.

Figures of Principal Notifiable Diseases for the week and those for the corresponding week last year, for: (a) England and Wales (London included). (b) London (administrative county). (c) Scotland. (d) Eire. (e) Northern Ireland.

Figures of Births and Deaths, and of Deaths recorded under each infectious disease, are for: (a) The 126 great towns in England and Wales (including London). (b) London (administrative county). (c) The 16 principal towns in Scotland. (d) The 13 principal towns in Eire. (e) The 10 principal towns in Northern Ireland.

A dash — denotes no cases; a blank space denotes disease not notifiable or no return available.

Disease	1941					1940 (Corresponding Week)				
	(a)	(b)	(c)	(d)	(e)	(a)	(b)	(c)	(d)	(e)
Cerebrospinal fever	370	29	66	3	14	606	35	105	3	4
Deaths		1	6				5	17		
Diphtheria	1,015	50	298	24	39	662	41	232	42	39
Deaths	23	1	8	—	2	24	1	13	2	2
Dysentery	156	12	23		—	42	7	45		1
Deaths			—	—	—			—	—	—
Encephalitis lethargica, acute	6	—	3		—	8	—	—		—
Deaths		1	—				—	2		
Enteric (typhoid and paratyphoid) fever	17	1	1	2	—	23	3	8	15	2
Deaths	1	—	—	—	—	3	—	—	—	—
Erysipelas			65	5	6			58	11	2
Deaths		—	—				—	—		
Infective enteritis or diarrhoea under 2 years										
Deaths	33	6	10	3	1	31	8	11	6	6
Measles	15,424	287	171		6	4,888	80	108		226
Deaths	20	1	1	1	—	2	—	—	1	14
Ophthalmia neonatorum	70	3	16		—	90	8	23		1
Deaths										
Pneumonia, influenzal*	1,495	70	56	17	5	1,883	99	58	9	26
Deaths (from influenza)	199	13	15	6	10	429	28	23	15	20
Pneumonia, primary			571	16				374	18	
Deaths		—		13	19		75		18	26
Polio-encephalitis, acute	—	—				1	—			
Deaths		—					—			
Poliomyelitis, acute	3	—	1	1	—	5	2	—	—	—
Deaths		—	—				—	—		
Puerperal fever	—	—	9	2	—	5	5	14	3	—
Deaths		—					—			
Puerperal pyrexia	139	5	7		6	150	11	28		1
Deaths										
Relapsing fever	—	—			—	—	—			—
Deaths										
Scarlet fever	1,161	52	166	29	40	980	35	111	52	77
Deaths	4	—	—	—	—	2	—	1	—	—
Small-pox		—	—		—	—	—	—		—
Deaths		—	—	—	—	—	—	—	—	—
Typhus fever	—	—	—	2	—	—	—	—	—	—
Deaths			—	—	—			—	—	—
Whooping-cough	3,617	45	822		17	519	17	23		16
Deaths	41	1	19	—	1	7	—	2	1	2
Deaths (0-1 year)	455	33	147	38	24	527	59	94	25	38
Infant mortality rate (per 1,000 live births)										
Deaths (excluding still-births)	6,439	837	937	272	221	7,415	1,108	899	279	230
Annual death rate per 1,000 persons living			20.4	18.1	19.4			17.0	18.6	20.2
Live births	5,304	378	916	386	234	6,593	1,002	913	372	262
Annual rate per 1,000 persons living			18.5	25.6	20.5			18.5	24.8	23.0
Stillbirths	223	10	35			263	37	41		
Rate per 1,000 total births (including stillborn)			37					43		

* Includes primary form in figures for England and Wales, London (administrative county), and Northern Ireland.

EPIDEMIOLOGICAL NOTES

Infectious Diseases for the Week

The numbers of cases of measles and of whooping-cough have slightly increased during the week. Whooping-cough had the larger actual and relative increase, the increase being distributed generally over the whole country. The slight rise in the incidence of measles was mainly due to a few areas only. Middlesex had the largest increase, from 612 to 860 cases, but the most striking difference for the two weeks was seen in East Suffolk, where the notifications rose from 99 to 257. The figure for diphtheria differed by only one notification from last week's total. Scarlet fever, with 139 fewer cases than in the previous week, had the lowest number of cases recorded since the beginning of last July.

Cerebrospinal Fever

A drop in the number of cases notified in England and Wales was shown by the returns for the week ending March 8; this was followed by a further fall for the week ending March 15, but the returns for the 22nd showed a slight increase (eight cases) on the previous week. In the immediate pre-war year the weekly notifications for cerebrospinal fever ranged from 10 to 50, with the greatest incidence in the first quarter; in 1938 and 1939 approximately one-third of the annual total was recorded in this quarter. The disease first increased to serious epidemic proportion in the second week of 1940, when 107 cases were returned as compared with 52 for the previous week. The weekly totals increased rapidly until a maximum of 623 cases was reached in the ninth week, and then slowly declined to a minimum of 107 notifications in the week ending September 7, 1940. The number of weekly cases increased slowly, and 229 cases were recorded in the first week of 1941, the beginning of the epidemic period. The rate of increase during the 1941 epidemic was very much less than in 1940, and so, despite the higher initial figure, the number of cases recorded in the sixth week was less than the number recorded in the sixth week of 1940. The trends of the two epidemics are illustrated in the chart. In Scotland the notifications have fallen from 97 to 66, a decrease of 33%.

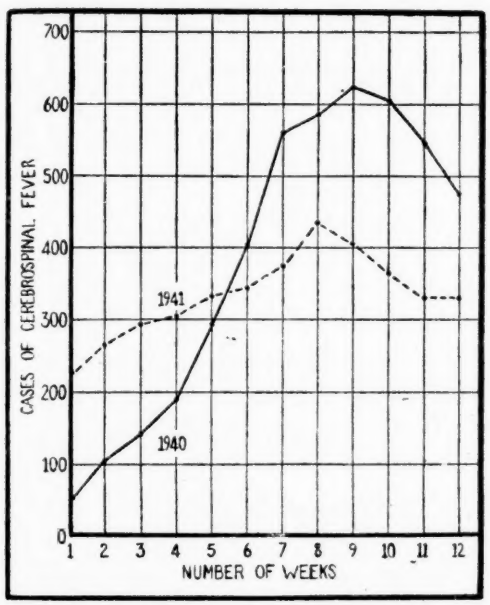

Chart showing incidence of cerebrospinal fever in the first twelve weeks of 1940 and 1941

Dysentery

A further fall has occurred in the number of notifications. All the 26 cases from Bedford were from Biggleswade R.D.; of the 15 cases in Essex, 10 were from Colchester M.B. and 5 from Brentwood; the 13 cases in Hertfordshire were all from Bushey U.D.; of the 27 cases from Lancaster, 8 occurred in Whiston R.D. and 6 in Lancaster M.B.; 9 of the 13 cases reported from Surrey came from Coulsdon and Purley U.D.; Goole M.B. accounted for 7 of the 13 cases in Yorkshire, West Riding. Of the 23 cases reported in Scotland, 8 were from Edinburgh.

Ophthalmia Neonatorum

Almost half of the cases reported in England and Wales were returned from two towns, Liverpool 13 and Birmingham 18. Eleven, almost three-quarters, of the Scottish cases were from Glasgow.

Medical News

The Pharmaceutical Society of Great Britain will celebrate its centenary on Tuesday, April 15, by a Thanksgiving Service in St. Pancras Church, Euston Road, at 11 a.m., at which the address will be given by the Right Rev. Bishop H. Crotty, Vicar of St. Pancras, and by a commemoration meeting at the Conway Hall, Red Lion Square, W.C., at 2 p.m. that day. The Lord President of the Council, the Right Hon. Sir John Anderson, will speak.

The B.B.C. announces that on Sunday, April 13, at 6.45 p.m., a talk in the Home Service will be given on "One Hundred Years of Pharmacy," by Mr. Walter Deacon, president of the Pharmaceutical Society. This is in connexion with the centenary of the society. On April 30, at 1.30 p.m., it is hoped to include a broadcast from the Red Cross stamp sale.

The House and Library of the Royal Society of Medicine will be closed for Easter from Friday, April 11, to Monday, April 14, both dates inclusive.

The annual meeting of the Society for the Study of Inebriety will be held at the Medical Society of London, 11, Chandos Street, W., on Tuesday, April 8, at 4 p.m., when Dr. J. Y. Dent will open a discussion on "The Study and Treatment of Inebriety."

A discussion on vegetables as food has been organized by the nutrition panel of the Food Group of the Society of Chemical Industry, and it will be held at B.M.A. House, Tavistock Square, W.C., on Wednesday, April 9, from 11 a.m. to 4 p.m., with Sir E. J. Russell, F.R.S., in the chair. At the morning session Dr. M. A. Pyke will speak on the chemical composition of vegetable foods and their place in peacetime and wartime diets, Dr. H. V. Taylor on the planning of vegetable production, and Miss M. Olliver on the effect of cooking on the nutritive value of vegetables. After the luncheon interval Mr. W. B. Adam and Dr. Allen will deal with the effect of canning, and of drying and other forms of preservation, on the nutritive value of vegetables. Although no tickets are required, those attending as guests of the society come under the jurisdiction of the Ministry of Home Security with regard to publication of the proceedings.

University College Hospital has arranged, with the co-operation of the Watford Peace Memorial Hospital, as a war-time measure, to open consultative out-patient clinics there. The clinics are being held as follows at 2 p.m.: surgical clinic, Monday; medical clinic, Tuesday; gynaecological clinic, Thursday. The clinics are conducted by members of the staff of University College Hospital, and all new cases attending are required to present letters of recommendation from medical practitioners.

Wynne Mariette Stuart Campbell, aged 42, described as a secretary, who, in the name of Lady Campbell, was alleged to have posed both as a member of the Secret Service and as a surgeon commander in the Royal Navy, received a sentence of three months' imprisonment at Marlborough Street Police Court, London, on March 25. Arrested at Glasgow, she was accused under the Defence Regulations of doing an act calculated to suggest falsely that she was a surgeon commander R.N., and she was charged also under the Medical Act with falsely pretending to be a surgeon.

Dr. Roscoe W. Hall, clinical professor of psychiatry at George Washington University, has been elected president of the American Psychiatric Association.

Letters, Notes, and Answers

All communications in regard to editorial business should be addressed to THE EDITOR, BRITISH MEDICAL JOURNAL, B.M.A. HOUSE, TAVISTOCK SQUARE, W.C.1.

Authors desiring REPRINTS of their articles must communicate with the Secretary, B.M.A. House, Tavistock Square, W.C.1, on receipt of proofs. Authors over-seas should indicate on MSS. if reprints are required, as proofs are not sent abroad.

ADVERTISEMENTS should be addressed to the Advertisement Manager (hours 9 a.m. to 5 p.m.). Orders for copies of the *Journal* and subscriptions should be addressed to the Secretary.

TELEPHONE No.—B.M.A. and *B.M.J.*: EUSTON 2111.

TELEGRAPHIC ADDRESSES.—EDITOR, *Aitiology Westcent, London*; SECRETARY, *Medisecra Westcent, London*.

B.M.A. SCOTTISH OFFICE: 7, Drumsheugh Gardens, Edinburgh.

QUERIES AND ANSWERS

Tinct. Opii Acet.

DR. CATHERINE THOMAS writes: I shall be obliged if any reader will kindly let me know the formula for tinct. opii acetatis that was in *Neligan's Dublin Pharmacopoeia*.

Sjögren's Syndrome

DR. F. PARKES WEBER (London, W.) writes in reply to Dr. Margaret Colls (March 29, p. 500): The only English account under the above heading is by Dr. J. H. Sheldon (*Proc. roy. Soc. Med.*, 1938–9, **32**, 255). Dr. Colls does not mention the presence of kerato-conjunctivitis sicca, the feature which led Henrik Sjögren (an eye specialist in Stockholm) to make his series of communications on the subject in the *Acta Ophthalmologica*. Dr. W. Stahel, in St. Gallen, claims excellent results (*Helvetica Medica Acta*, 1938, **5**, 579) from three months' treatment with 16,000 biological units of vitamin A daily, but I have not heard that his results have been confirmed.

Conserve of Hips

MRS. DOROTHY D. STEWART, M.Sc. (Hampstead) writes: The following recipe is taken from *The Compleat Housewife*, dated 1739. The conserve prepared from hips by this method would retain the full amount of vitamin C, as no boiling is necessary during its preparation. Our ancestors seemed to realize the necessity for storing such products to be used during the late winter season.

"Gather the hips before they grow soft, cut off the heads and stalks, slit them in halves, and take out all the seed and white that is in them very clean, then put them in an earthen pan, and stir 'em every day, else they will grow mouldy: let them stand till they are soft enough to rub thro' a coarse hair sieve: as the pulp comes, take it off the sieve: they are a dry berry, and will require pains to rub it thro'; then add its weight in sugar, and mix it well without boiling, keeping it in deep gallipots for use."

Income Tax

Practice Carried On in Absence—Expenses

"LEASEHOLDER'S" practice has been carried on under the Emergency Scheme: can he still claim half annual value and rates? A ground rent is being paid for a house which has been destroyed: is this correct?

*** As regards the expenses, the answer depends on the particular facts. If the house is still being used professionally some deduction is due, but whether the half as before or not depends on what change (if any) there has been in the ratio of private to professional use. The authorities are not likely to want to drive a hard bargain in the circumstances. The liability to pay the ground rent (less income tax, of course) remains in spite of the destruction of the house: "Leaseholder" will presumably receive compensation under the proposals of the War Damage Bill, and the freeholder will be liable to bear some portion of the contributions to be levied under those proposals.

Fall in Earnings of Husband and Wife

"WIFE" explains that for 1940–1 her husband has been assessed for her salary of £500 per annum in addition to assessments of £219 and £274 for receipts from his own and her literary work. The latter items will be much reduced for 1940–1 as compared with the 1939–40 amounts on which the assessments are based.

*** There is no right of appeal at present, but if the total earnings for the actual year 1940–1 are less than 80% of the aggregate assessed (i.e., are less than £795) a reduction to the actual amount can be claimed. It is presumably for that reason that the inspector of taxes states that he can do nothing until the next return is made.

LETTERS, NOTES, ETC.

Garden Work for Convalescents

DR. SINCLAIR M. EVANS (Baslow, Bakewell) writes: In country districts we are being encouraged to dig for victory during the coming season. A good deal of extra work could be performed willingly by convalescent patients who are at present condemned to enforced idleness through the by-laws of their approved society. Surely the present state of emergency merits some relaxation of these rules at the discretion of the attending practitioner.

Medical Woman-power

"X" writes: Knowledge that I am not the only unwanted doctor gives me a small measure of consolation. Anticipating a call upon my services I had planned my domestic arrangements so that I should be quite free to work outside my home—a difficult and expensive task these days. As I do not wish to cut myself adrift from my husband and small children I offered my services through several channels for part- or whole-time work in my district even up to a radius of twenty miles. Apart from a short locum and being a reserve medical officer at a small first-aid post I appear unwanted for the war effort. In this district there are hospitals staffed by men of military age, practices are combined so that one man does the work of one or two absentees, and this in a reception area. Retired men have returned to duties which must be in some cases too arduous for them. There are many Service girls and, to the best of my belief, no medical woman is provided for them. Sex prejudice seems to be rife in some localities, where the medical woman is looked on as something out of place. Surely we are not expected to take the step back, as Nazidom has, and bind ourselves to the household regardless of years spent in training and practice. I pause in my labours as cook-general to write this, as, alas! my staff have found their services more in demand for work of national importance than I have mine.

Calcium for Mucosal Ulcers

DR. J. SHACKLETON-BAILEY (Suffolk) writes: I have read with interest Dr. Pappworth's article on cyclical mucosal ulceration (February 22, p. 271), and also the recent articles on calcium absorption and metabolism. In relation to these subjects I should like to record a case of mine in which the mucosal ulcers immediately retrogress on administration of "ostocalcium" tablets. This patient, aged 60, had been troubled by the condition for about thirty years in spite of a variety of treatments prescribed by practitioners and consultants. Prior to the menopause a new crop of ulcers occurred just before each menstrual flow. Since then, I believe, their appearance has been quite irregular.

Induced Hyperaemia with Sulphanilamide in Paronychia

DR. H. G. LANGDALE-SMITH (Tarrington) writes: In the last few months paronychia has been prevalent. Although sulphanilamide applied locally and by the mouth did not appear to have much effect, it was found that by inducing hyperaemia by Bier's method to the affected limb at intervals of two, four, and six hours after the administration of 1 to 5 grammes of sulphanilamide by the mouth good results were obtained. Presumably the concentration of sulphanilamide was greater in the congested area than in the rest of the circulation. During the administration of sulphanilamide it is usual to exclude salts as well as eggs and onions, on the assumption that they contain sulphur. It seems, however, unlikely that salts are altered chemically in the bowel, and I learnt from one authority that sulphur is liberated in the bowel by any aperient, and therefore it is only necessary to exclude salts on account of their aperient action. It would be interesting to know if any untoward results have been noticed in diarrhoea when sulphanilamide is taken.

Medical Advertisements by Post

DR. W. ST. AUBYN HUBBARD (Falmouth) writes: This morning I received another batch of advertisements from various firms, all of which were promptly put into the waste-paper basket. Most of us have this bother. But what a waste of paper, cardboard, and time—especially just now! I suggest that the time is ripe to ask the principal firms upon whose products we have always relied to give up their rather childish pictorial advertisements and limit themselves to plain statements of facts on a standard size of thin card, preferably small postcard size, which we can file neatly if we wish to do so. If the big firms would only arrange among themselves to do this we could safely consign all other advertisements to the waste-paper basket without perusal. This would save the profession a tremendous amount of time and annoyance during the year.